THE FOUNDRY

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The New Foundry of the General Electric Company, at Schenectady, New York.

One of the largest, best and most completely equipped foundries ever erected, if not actually the best, is the famous one recently finished at the Schenectady plant of the General Electric Company. One can form some idea of the marvelous growth of the electrical industry when it is noted that this is the eighty-third important building erected at the plant.

The contracts for the building were let in the latter part of March, 1898, and early in January of the present year, the first cast was made in this, the largest foundry in the United States.

Fig. 1 gives an excellent view of the complete steel skeleton. The main building is 140x503 feet; the clearing room wing, 120x103 feet; the large lean-to 38 feet 6 inches by 243 feet, and the small lean-to, 11 feet 4 inches by 152 feet 4 inches. The height of the side walls is 23 feet 9¾ inches; the main gables, 58 feet 3 inches; the wing gables, 51 feet 8 inches, and the cupola room walls, 28 feet 8 inches; cubical contents, 3,250,000 feet.

The general comfort and convenience of the workmen has received particular consideration in the construction of this splendid workshop. The provision for light and ventilation has probably never been surpassed, if indeed it has been equaled elsewhere. There is upward of 23,000 square feet of skylight, and nearly 13,000 square feet of window glass in the building, thus affording ample light to every part of the interior.

The system of ventilation, installed by the Buffalo Forge Company, is very elaborate, and changes the air throughout the building every four hours, the supply being heated in cold weather, thus affording fresh air of any temperature desired at all times, the smoke and gases passing rapidly up out of the ventilators at the apex of the roof, these being arranged for easy and quick regulation, so that the dust and smoke attending the casting and shaking out of the molds can be rapidly removed.

Every 2,600 square feet of floor space is provided with an arc lamp, which renders the conditions for night-work as nearly equal to those of daylight as possible.

THE CUPOLAS.

There are two cupolas, both of the Colliau type, the larger one having a capacity of 18 tons per hour, the smaller, 7 tons. Another cupola, of 11 tons capacity, will be erected, which will give a possible capacity for the shop of 36 tons per hour. While the larger cupola supplies the iron for the great crane ladles, it has also an auxiliary tap hole on one side for the use of the bench molders, and for the lighter bull-ladle work, either tap being used without reference to the question of whether the other is running or not. No iron has to be carried by hand to exceed 120 feet. The large ladles, some of them having a capacity of 15 tons, are transported by means of traveling cranes, and rail cars.

The traveling cranes are shown in Figs. 2, 3 and 4. In Fig. 2 may be seen also one of the cars, loaded, on the track that runs down the center of the room. In Fig. 3 is seen the man who operates the crane, in the cage at the right. Also, extending down the shop, a little to the right of center, is the bench loaded with patterns that are in use for the day.

Fig. 4 gives a view of the empty shop before molding operations began.

Fig. 5 exhibits one of the bays, with one of the smaller traveling cranes in the foreground.

Fig. 6 shows the cleaning room, with several of the tumblers in view.

Fig. 7 is a section through the foundry, showing positions and dimensions of small and large core ovens, cupola, electric traveling crane in main building, with a small jib crane attached to column to the right and small electric traveling crane in the bay, and other details.

Fig. 8 shows details of the ball-bearing doors for large core ovens.

A Roots rotary pressure blower supplies a blast of 660,000 cubic feet per hour at 95 revolutions, and is driven, direct, by a 60 horse-power motor.

The charges are weighed on the ground floor, and are then lifted to the charging floor by a 2,200-lb. hydraulic elevator, the floor being of sufficient capacity to carry the entire day's stock. A coke shed, of 600 tons capacity, is located just outside the foundry, and is provided with automatic conveying appliances.

Six thousand tons of sand can be stored in the sheds provided for the purpose. The sand is mixed and tempered by the aid of a Sellers centrifugal mixer, electrically driven, and is delivered to the molders ready for use, being transported on 21½-inch gauge cars. The mixer, with 3-horse power motor, is portable, and so may be used at any point that may be most convenient.

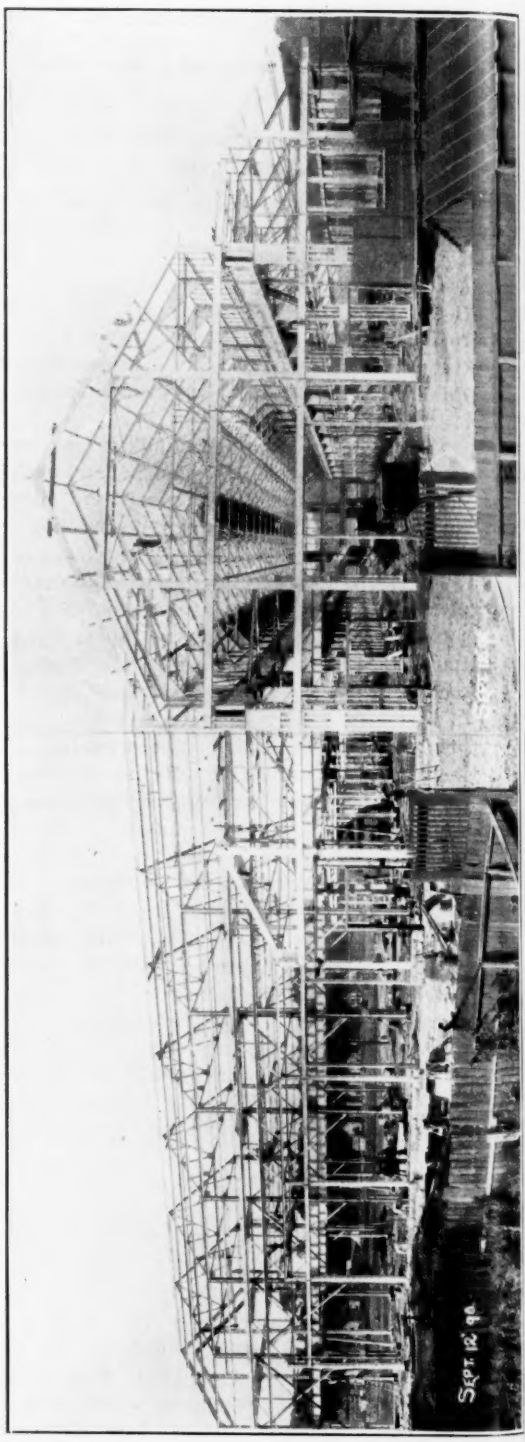
CRANES.

There are seven electric cranes in the foundry, ranging in capacity from 5 to 40 tons. The principal crane, of 40 tons capacity, traverses a space 65 feet wide, the full length of the main building. A smaller crane, having only 10 tons capacity, traverses the same space, running on the same tracks. A 10-ton traveling crane, with a span of 47 feet 2 inches, traverses the whole length of the cleaning room, connecting with the one in the main room. A 7-ton and three 5-ton box cranes are located at various points in the wings. By referring to Fig. 4 it will be seen that the main columns support the tracks for the great traveling cranes, and also the roof. A socket at the base, and a bracket above, may be removeably attached to any one of these columns, for the purpose of supporting a jib crane, which may be caught up by the traveling cranes and removed from place to place, as convenience may require. There are three 5-ton jib cranes to be used in this manner.

There is a railway system running throughout the plant, connecting the pig iron yard, coke and sand sheds with all parts of the foundry, and large ladles of iron are sometimes transferred from the reach of one crane to that of another on cars running on these tracks, of which there are two different gauges, viz., 21½ inches and 36 inches.

CORE OVENS.

The large core ovens (see Fig. 8) are constructed very much like those in other up-



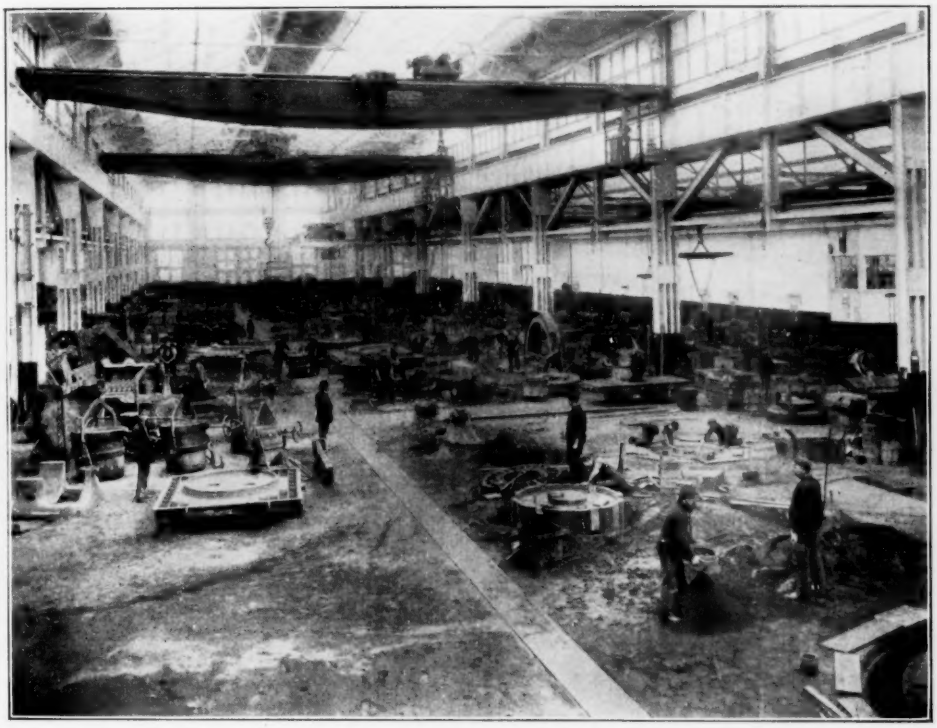


FIG. 2.

FIG. 3.

FIG. 4.

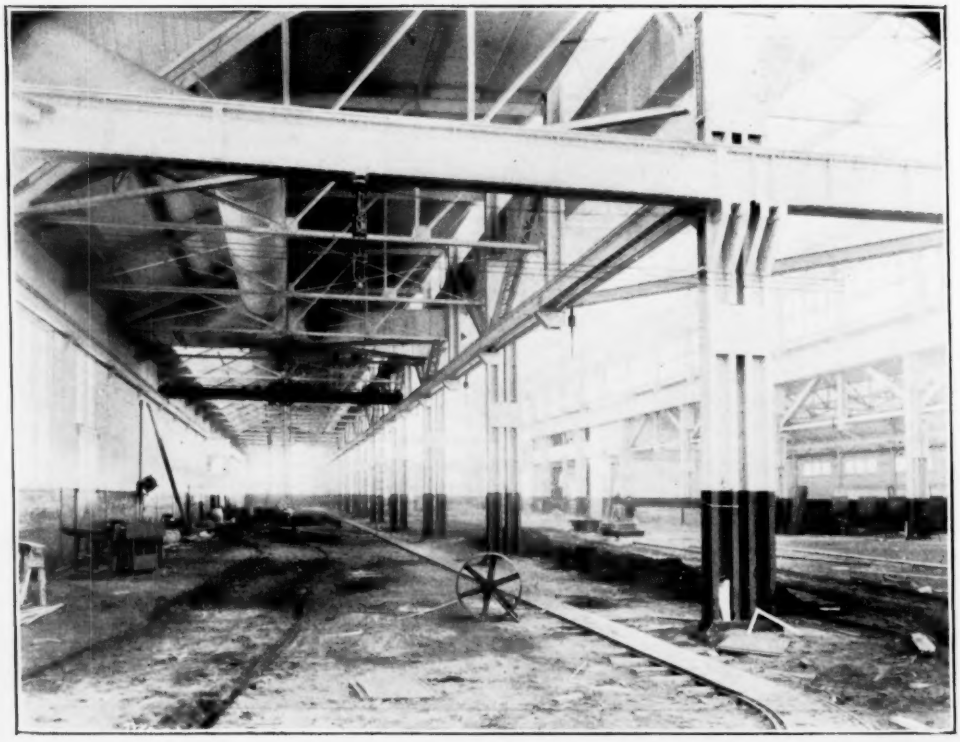


FIG. 5

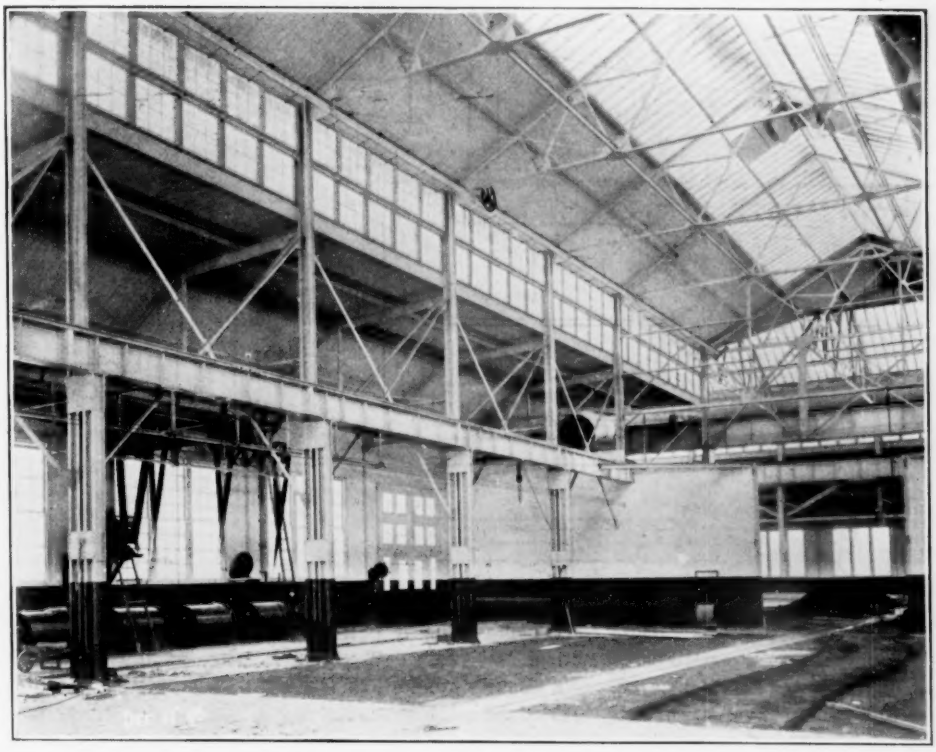


FIG. 6

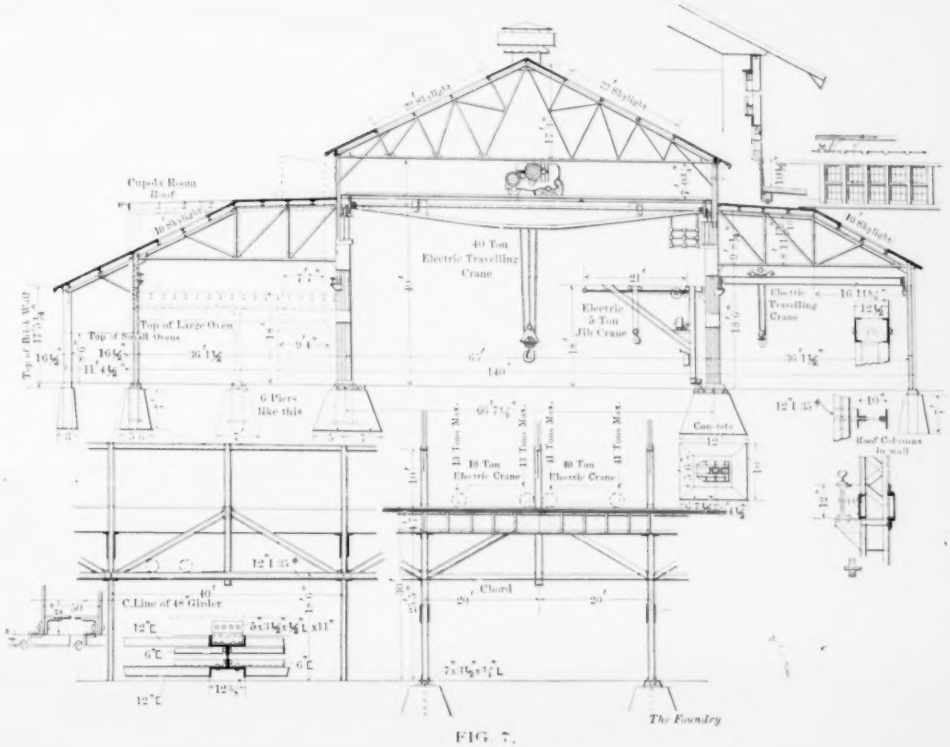

Cupola Room Roof
10' Skylight
25' Skylight
40 Ton Electric Travelling Crane
Electric 5 Ton Jib Crane
Electric Travelling Crane
Top of Large Oven
Top of Small Ovens
6 Piers like this
Concrete
10 Ton Electric Crane
40 Ton Electric Crane
Roof Columns in wall
C.Line of 48" Girder
Chord
The Foundry

FIG. 7.

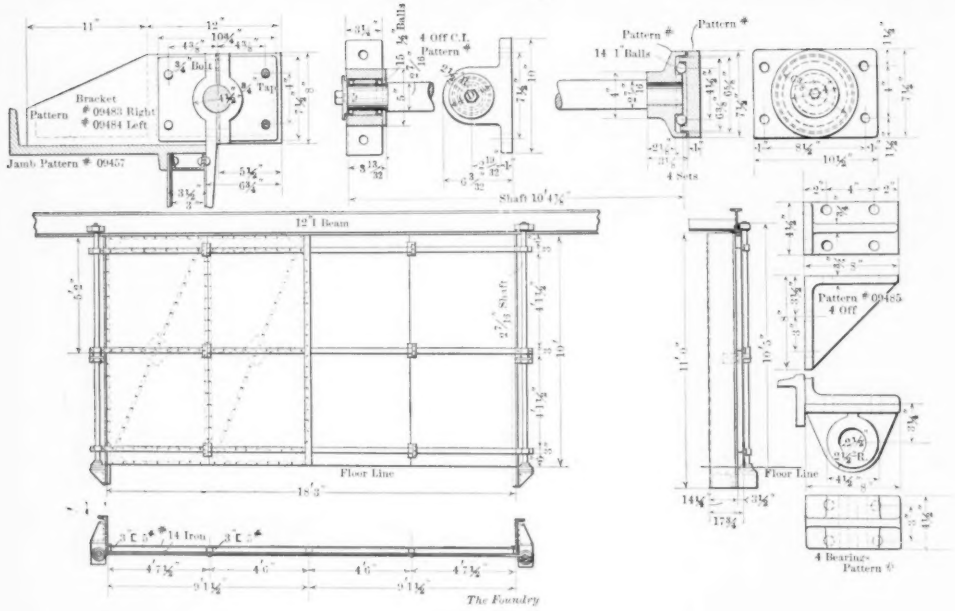


FIG. 8.

to-date foundries, but the doors have some novel features that merit special notice.

The heavy steel doors measure, each, about 9 feet wide by 10 feet high. Each door is divided at the center lengthwise, having three hinges at the juncture. The double door is attached to a 2 7-16 inch shaft, having a ball-bearing attachment at the bottom and roller bearing at the top, which renders their operation a very easy matter.

The ovens for drying the smaller cores (see Fig. 9) have also several novel features. There are no doors affixed to the ovens, but, instead, there is a door attached to each

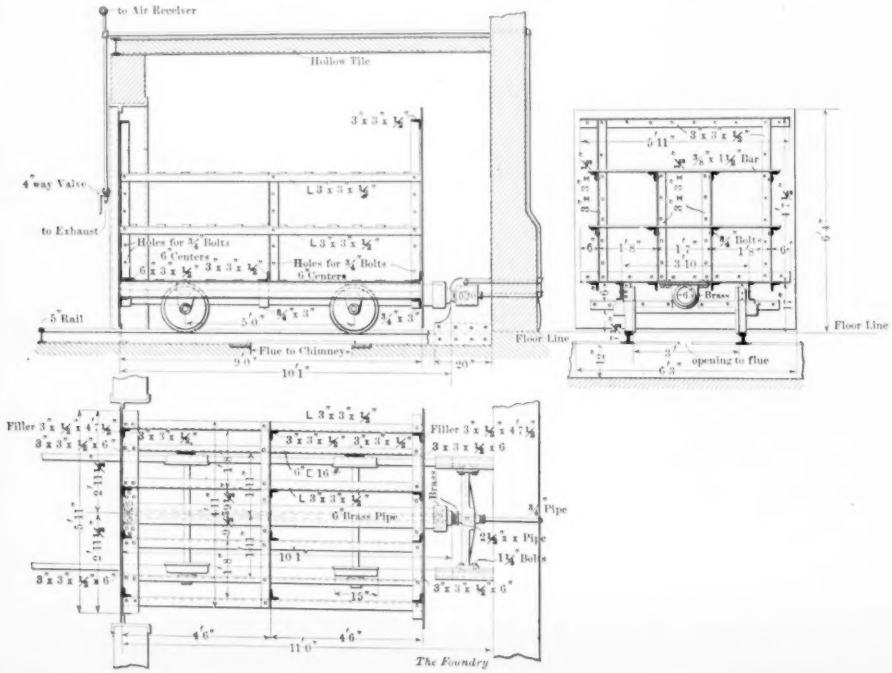


FIG. 9.

end of the car, in such manner that when the car is in the oven, the door on the outer end of it closes the aperature; and when the car is run out, the door on the opposite end performs the same function. Thus the oven is opened and closed by the simple process of running the car out. By this means the oven is left open but for the shortest possible length of time, the economy of which, in the conservation of heat, is considerable. This car is run out and in by means of compressed air. The cylinder, a 6-inch brass

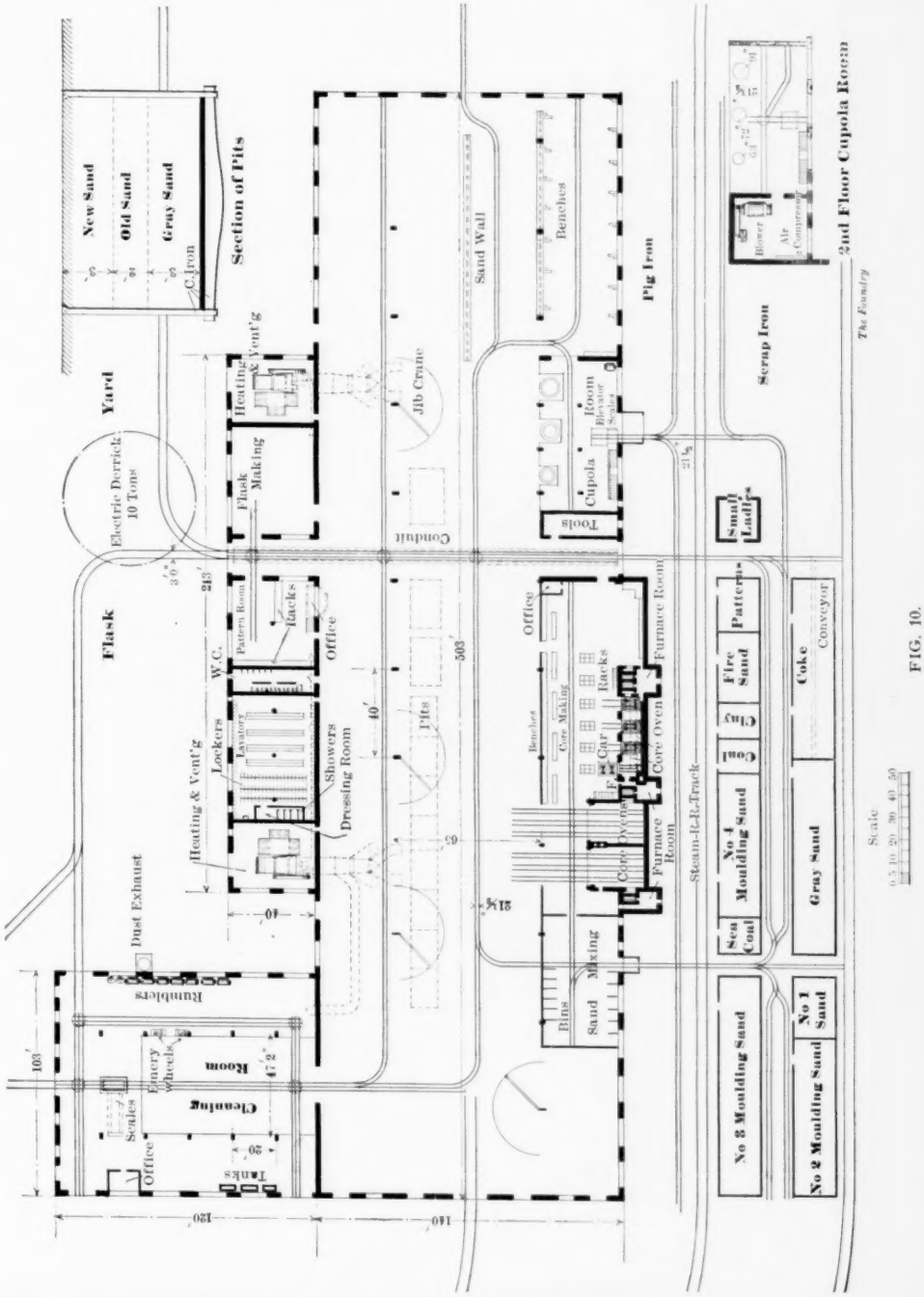


FIG. 10.

tube, is attached, under the body of the car, just above the axles. The piston rod is hollow, and double-acting. The car is moved out and in by simply turning a four-way valve. The roof of the oven is of hollow tile. The flue runs under the oven to the chimney. There are four of these cars. The compressor which supplies the air power is automatic in operation, and works only when air is being consumed. The cars are constructed entirely of steel and brass, and are about 10 feet long by 6 feet 3 inches wide.

ers, the latter constructed of wire, in order that when emptied, the hose may be turned on and a thorough cleansing may be easily effected. The floor, walls and ceiling are of stone and tiling. Shower baths are also provided. The office of the foreman is elevated considerably above the floor, and is so situated as to command a view of every part of the main building.

MATERIALS OF CONSTRUCTION.

The foundations are constructed of 1,833 cubic yards of concrete, while the curtain walls contain 1,203 cubic yards of stone,

FIG. 11.

The cleaning and chipping department is in a separate wing. In this are 9 tumblers, of the exhaust type, so that all dust is carried out of the building. The heating and ventilating system, flask-making room, pattern room, water closet, lavatory and dressing rooms, and also the foreman's office, are ranged along the side of the main room, back of the cleaning room wing, and disconnected from the latter by about 35 feet of open space. The lavatory is large and well ventilated, and is provided with lock-

which surround 27,000 cubic yards of earth filling; and outside of this, 53,000 yards of filling was required to complete the yard level. In the side walls and in other parts were used 1,250,000 bricks, and the framework consumed 1,200 tons of steel. About 36,000 square feet of glass for windows were required.

Fig. 4 gives a good illustration of the columns which support the crane tracks and the roof. These columns are double, the shorter member supporting the crane tracks,

and the longer one the roof. The former is composed of four Z bars 6 inches by ⅜ of an inch by 24 feet 4½ inches, and one web 8 inches by ⅜ of an inch by 25 feet 4½ inches. The latter is of four Z bars 6 inches by ⅜ of an inch by 40 feet 6 inches,

FIG. 12.

and one web 8 inches by ⅜ of an inch by 56 feet.

Fig. 10 is the plan of the plant; Figs. 11 and 12 are exteriors of the finished structure from different positions.

National Founders' Association.

Reference was made in these columns recently to the work of the National Founders' Association, and particularly to the results of its conference with officers of the Iron Molders' Union, which mean the beginning of a regime of arbitration and of annual wage adjustments for foundries. The strength of the organization and the influential place it has attained thus early in its career will appear from the list of general and of district officers which we give below:

President, O. P. Letchworth, Pratt & Letchworth Co., Buffalo, N. Y.; vice-president, H. M. Leland, Leland & Faulconer Mfg. Co., Detroit; treasurer, W. H. Wells, Holly Mfg. Co., Lockport, N. Y.; secretary, John A. Penton, Detroit. Administrative Council—O. P. Letchworth, president, Buffalo, N. Y.; W. O. Barbour, Barbour-Stockwell Co., Boston, Mass.; Jas. Barclay, Deere & Mansur Co., Moline, Ill.; A. J. Caldwell, Henry R. Worthington, Brooklyn, N. Y.; G. E. Emmons, General Electric Co., Schnectady, N. Y.; I. W. Frank, Frank-Kneeland Machine Co., Pittsburg, Pa.; H. M. Leland, Detroit, Mich.; R. C. McKinney, Niles Tool Works Co., Hamilton, O.; C. L. Newcomb, Deane Steam Pump Co., Holyoke, Mass.; Geo. S. Rominger, Girard Iron Works, Philadelphia, Pa.; Jos. A. Stone, Riverside Foundry Co., Cleveland, O.; Wm. Taylor, Chandler & Taylor Co., Indianapolis, Ind.; W. H. Wells, Lockport, N. Y.; W. H. Pfahler (honorary), Philadelphia, Pa.

First District Committee—Chairman, C. L.

Newcomb, Holyoke, Mass.; vice-chairman, W. O. Barbour, Boston, Mass.; G. B. Buckingham, Arcade Malleable Iron Co., Worcester, Mass.; H. A. Carpenter, A. Carpenter & Sons Foundry Co., Providence, R. I.; Walter Perry, Farrel Foundry & Machine Co., Ansonia, Conn.

Second District Committee—Chairman, A. J. Caldwell, Brooklyn, N. Y.; vice-chairman, G. E. Emmons, Schnectady, N. Y.; Geo. H. Cushing, Goulds Mfg. Co., Seneca Falls, N. Y.; Edward Maher, Maher & Flockhart, Newark, N. J.; John E. Sweet, Straight Line Engine Co., Syracuse, N. Y.

Third District Committee—Chairman, I. W. Frank, Pittsburg, Pa.; vice-chairman, Geo. S. Rominger, Philadelphia, Pa.; Philip Mathes, Brittan & Mathes Co., Pittsburg, Pa.; Frank Moore, Pittsburg Malleable Iron Co., Pittsburg, Pa.; Walter Wood, R. D. Wood & Co., Philadelphia, Pa.

Fourth District Committee—Chairman, Jos. A. Stone, Cleveland, O.; vice-chairman, R. S. McKinney, Niles Tool Works Co., Hamilton, O.; Chas. A. Bauer, Warder, Bushnell & Glessner Co., Springfield, O.; C. H. Booth, Lloyd Booth Co., Youngstown, O.; M. T. Conklin, Gale Mfg. Co., Albion, Mich.

Fifth District Committee—Chairman, Wm. Taylor, Indianapolis, Ind.; vice-chairman, Jas. Barclay, Deere & Mansur Co., Moline, Ill.; Geo. F. Cottrill, Green's Car Wheel Mfg. Co., St. Louis, Mo.; L. W. Noyes, Aerometer Co., Chicago, Ill.; E. H. Walker, J. I. Case Threshing Machine Co., Racine, Wis.

Pittsburg Foundrymen's Association.

The regular monthly meeting of the Pittsburg Foundrymen's Association was held Monday evening of this week at the regular quarters, Frohsinn Hall, Pittsburg. The attendance was very good. M. A. Moran, foreman of the foundry department of the Keystone Bridge Co., Pittsburg, was elected an associate member. There was some discussion about the financial end of the entertainment of the American Foundrymen's Association whose annual convention is to be held in Pittsburg next month. It was stated that the subscriptions had been coming in satisfactorily, but that considerably more money was still needed. It was pointed out that these subscriptions are being solicited from firms and companies, and not from individuals. The secretary, F. H. Zimmers, announced that there might be some who should be invited to the convention whom the secretary of the national organization would have no means of reaching, and offered to send invitations to any parties whose names should be sent to him for that purpose.

There was no regular paper scheduled for the evening, and the president announced that a general discussion would be had on any subject which might be presented. Dr. Moldenke then called attention to the system being installed in the General Electric Co.'s new foundry, of handling the sand by a bucket system, and asked for opinions as to the desirability of some such system for handling sand, in preference to the present system using scrapers, which consumes a great deal of power, and which is liable to vexatious interruption, owing to the chain breaking. He referred to the bucket system used in handling ore as very successful, and considered this an indication that it would be good for handling sand. Mr. Mathes stated that some time ago his concern had tried an automatic molding machine, which, so far as the general apparatus was concerned, was a failure; but there was used a bucket system in connection with a trough, for conveying the sand, and this had worked very well. Working in the trough was a wooden cylinder, about 6 inches in diameter and, say, 16 feet long, with flattened spikes driven in it, to convey the sand to where it was to be used. The action was thoroughly to "temper" or mix the sand.

Mr. Moran brought up the subject of sandless pig iron, and stated that in their work (the foundry department of the Keystone Bridge Co.) they had been using sandless pig iron altogether, and had found it very satisfactory. There were several advantages. They were unable to use the rule of ⅛-inch shrinkage to the foot, the shrinkage being considerably less than this, and, consequently, more uniform. The iron they had been getting showed a chill of, say 1-16-inch depth, but the castings showed no chill at all, and were more readily machined. The pigs would break in two or three in unloading, and altogether the material did not have an inviting appearance, analysis having to be relied on entirely in gauging the metal. The melting ratio had been reduced to one to six or seven, showing a reduction in fuel, and there was a reduction in loss as well, the loss now being say 6 per cent, while with

the old sand cast iron it was about 10 per cent. Mr. Kebler asked whether with the sandless pig iron they had to order a higher silicon, and Mr. Moran stated that the silicon analysis would be ordered the same as before. Mr. Frank asked if the sandless iron cut the cupola more, and if there was any difficulty in this direction, to which it was replied that the results were the other way. The cupola worked easier, lasted just as long, the bottom dropped more readily, and there was less lime needed, and the iron would run quicker. A great deal of other work consisted in name plates for bridges, which were rather thin, while the letters would stand out very sharp. Another class of work was sheaves, which had to have a feather edge, and this would be removed by filing later, to prevent cutting the ropes. The casting would be good, clear out to the edge, and soft enough to file.

Dr. Phillips stated that his experiences in the South they found in 1895 that they could not sell a sand-cast bar for open-hearth work, and consequently began casting with the machine. The first 30,000 tons he examined closely as it was made, and there was no chilling noticed whatever. It was graded as No. 1 and No. 2 foundry. The color was a dark gray. He mentioned that a few days ago Mr. Scott had taken him to the Lucy furnaces, and they had a couple of workmen break about 30 pigs, which showed no chill at all, the grain running out clear to the edge. It required several drops from a hight of 9 feet to break the pigs, and they broke with a rather dull thud rather than with a ring. He declared that the system of casting in molds was the greatest invention of the century for the benefit of the foundry trade, and was surprised the foundrymen had been so backward in actually demanding it.

Mr. Kebler said that it was the fact that customers objected in many cases to iron cast in chills. He mentioned a small lot of iron which a customer had recently rejected because it had been cast in molds. It developed that this iron had been an off color, the sulphur being about .07 per cent and the silicon was .25 per cent. When dropped the pigs would break in pieces and there was a bluish color throughout. Dr. Phillips said that a sandless pig containing one-tenth silicon could not be told from a dark gray foundry iron. They had made a large quantity which was guaranteed to be under 1.0 silicon and .05 sulphur, with carbon 2.75 graphitic and .50 combined.

Owing to the general interest manifested in the subject, it was thought well to devote an evening to its discussion, and Mr. Moran consented to present a paper on the use of sandless pig iron from his standpoint. Dr. Phillips was aked to contribute some statistics to the subject, covering the tonnage made under the system, and the furnaces now using it.

Western Foundrymen's Association.

The regular monthly meeting of the Western Foundrymen's Association was held at the Great Northern Hotel, Chicago, April 19, at 7:30 p. m. Vice-President A. M. Thompson in the chair.

Those present were the following: James Frake; B. R. Marchand, Illinois Steel Co.; Hanson McDowell; C. J. Wolff, L. Wolff Mfg. Co.; R. J. Cleveland, Cleveland & Barr; C. H. Hopke, Western Foundry Co.; R. K. Thatcher, C. K. Pittman; Jas. E. Evans, Theodore Kauffman, S. Obermayer Co.; A. M. Thompson, Link Belt Machinery Co.; B. M. Gardner, the Iron Trade Review; H. S. Vrooman; E. J. Welch, A. Bolter & Sons; H. K. Maas, W. Barton, Siemens-Halske Electric Co.; W. H. Rooney, American Car & Foundry Co., Wells-French shops; A. W. Rom, with Jas. Frake, all of Chicago.

The meeting opened with a general discussion of methods to increase the interest in the work of the association among founders and to enlarge the membership. The result of the discussion was the following which was adopted: Resolved, That it is the sense of the association that some plan be formulated for the controlling of prices and also for the adoption of a uniform credit system.

The chair was authorized to appoint a committee of five, of which the president of the association is ex-officio a member, to suggest a plan for controlling the prices of castings, and for a uniform credit system, the committee being instructed to call a meeting of the foundrymen of Chicago to discuss these plans, when formulated.

Nominations for officers for the ensuing year were then called for, the following names being put in nomination: For president, A. M. Thompson, W. A. Jones, C. J. Wolff. For vice-president, R. J. Cleveland, James Frake, William Ferguson. For sec-

retary, B. M. Gardner, J. E. Evans, H. S. Vrooman, O. T. Stantial. For treasurer, R. J. Cleveland, O. T. Stantial. For directors, James Frake, A. M. Thompson, C. J. Wolff, C. H. Hopke, M. Salomon, B. R. Marchand, William Ferguson, F. G. Coffeen. For auditing committee, B. M. Gardner, J. E. Evans, H. S. Vrooman, W. A. Jones, A. W. Rom.

The proposed amendment to the by-laws was defeated.

The secretary read a letter from John A. Penton, secretary of the American Foundrymen's Association, announcing that the time set for the annual meeting of that association is May 16, 17, 18 and 19, the meeting to be held at Pittsburg. Secretary Penton outlined the program for the meeting, and invited the members of the Western Foundrymen's Association to attend. A committee of arrangements for transportation, etc., from Chicago and the West, consisting of C. J. Wolff and W. A. Jones, had been appointed, and Mr. Wolff, for this committee, announced that arrangements had been made with the Pennsylvania road for rates to Pittsburg and return for the meeting.

In view of the fact that the convention of the American Foundrymen's Association will occur in the same week in which the annual meeting of the Western Foundrymen's Association would be held, the latter being the third Wednesday in May, the secretary was instructed to call the annual meeting on the second Wednesday, May 10.

Philadelphia Foundrymen's Association.

The eighty-seventh meeting of the Foundrymen's Association was held at the Manufacturers' Club, in Philadelphia, on Wednesday, April 5, the president, P. D. Wanner, occupying the chair.

Mr. Wanner opened the meeting with a short address on "Cast Iron Pipe and Consolidation."

May 11, 1892, I read a paper on cast iron pipe at a meeting of the Board of Trade of Reading, Pa., which was published and freely commented upon, in which I said, among other things, the following:

Cast iron pipe commenced to be used for water works about the beginning of the present century. But sixteen of these works were constructed in this coutry prior to the year 1800, and eighty-seven up to the year 1850. The trade developed slowly until after 1850, when the large increase of water and of gas works made the demand for pipe proportionately large. The panic of 1857, followed by the Civil War, interrupted it materially, but after the war it became flourishing, and to such an extent that even the panic of the seventies did not seem to affect it until the year 1878. After that, owing probably to an overbuilding of water and gas works and the high price of pig iron, the trade remained quiet until the summer of 1881, when it became very active, and remained large and profitable until the end of 1887. These were seven years of unprecedented prosperity for the pipe manufacturers, but with them disappeared the large profits of the business—and yet from that time to the present the demand for pipe was large, and the number of water and gas works increased in the aggregate to 2,200 of water and 1,200 of gas, having a mileage of pipe of over 50,000, a distance twice around the world. The trade was also increased by a large demand from railroads, cities and towns for drainage, culvert and sewer purposes, but owing to the large number of new pipe foundries constructed throughout the country of late, and the increased capacity of the older ones, the demand fell short of the supply. In other words, we have had overproduction. All the new foundries built since the boom of the eighties could have been spared and the money saved to the investors. Its present condition is full of anxiety, and has brought about some very desperate movements, particularly on the part of southern establishments. View the situation as we may, it clearly indicates that this once prosperous and profitable trade will become uncertain and of doubtful tenure, and that location, equipment and management will be essential elements tributary to the success of pipe foundries hereafter. I believe that the several sections of the country will have their respective works to which their trade will be necessarily confined, and even in that case such territory will probably have to abandon some of its present works.

I said this all but seven years ago. Few, if any, predicted the future of the trade better, and none did more to uphold prices during these years of depression than I, and having dismantled two pipe foundries (one of which was among the very first in the country), I should at least be permitted to

run one foundry either in or outside of the consolidation. I believe, frankly, that the only hope for success in this trade for the future will lie in a combination that shall control the product and business of them all, either directly or indirectly. I have been in favor of such consolidation or control from the time I became interested in it. Its product is bulky and could naturally be limited to the several sections of the country or divisions of territory. I therefore maintained that it would be better that several sections should work together, or even in case of a few concerns here and there, than that they should all compete apart. This and all governments were created and are upheld by necessity. It will be so with both capital and labor and all trade or manufacturing interests in the future. It has been truly said that business is war, and to make it a success warlike methods will have to be resorted to, and success will be on the side of those who have the largest guns or aggregation of capital; in other words, a combination of the greater part of the trade will be able to dictate prices and a line of behavior to those outside, or crush them. It is no longer the survival of the fittest, but of that which can hold out best and longest.

The panic of the seventies and consequent depression suggested a combination to the pipe trade, and accordingly a notice was issued to all pipe men of the country to meet on December 17, 1879, at the Continental Hotel, Philadelphia, Pa., at which the following, according to the minutes of the meeting was agreed upon after a two days' session by all except the Warren Foundry & Machine Company, of Phillipsburg, N. J.; Matthew Addy, of the Cincinnati & Newport Pipe Company, Cincinnati, Ohio, acting as chairman, and Dr. J. D. White, of the Camden Iron Works, Camden, N. J., acting as secretary—viz:

"We, the undersigned cast iron pipe manufacturers of the United States, hereby agree to form an association for mutual benefit and protection, and more especially for the objects mentioned below:

"1. To devise some method to secure more remunerative prices.

"2. To divide the work or assets realized for the letting of the work on a basis equitable to all.

"3. To prepare uniform specifications under which we shall all pledge ourselves to bid at public lettings.

"4. To prevent the expansion of present shops or the building of new ones."

The company above referred to not attending nor agreeing to join, the object of the meeting failed.

With the splendid revival of the trade during the eighties no further effort was made to combine outside of what was done by the western pipe men, and later by the southern. The want of a sufficient demand and consequent decline in prices prompted a meeting of the eastern pipe men, for which a notice was issued to meet at the Astor House, New York, December 20, 1892, which was attended by representatives from the Warren Foundry & Machine Company, of Phillipsburg, N. J.; McNeal Pipe & Foundry Company, of Burlington, N. J.; Buffalo Cast Iron Pipe Company, of Buffalo, N. Y.; Utica Pipe & Foundry Company, of Utica, N. Y.; Reading Foundry Company, Limited, of Reading, Pa.; R. D. Wood & Co., of Philadelphia, Pa.; Jackson & Woodin Mnfg. Co., of Berwick, Pa., and also by letter, the National Pipe & Foundry Company, of Scottdale, Pa., and the Emaus Pipe Foundry Company, of Emaus, Pa.

The meeting was organized by the election of Wm. Runkle, of the Warren Foundry & Machine Company, as president; A. H. McNeal, of the McNeal Pipe and Foundry Company, as vice-president; George B. Hayes, of the Buffalo Pipe & Foundry Company, as treasurer, and P. D. Wanner, of the Reading Foundry Company, Limited, as secretary. A constitution and by-laws were adopted. The association was named the Eastern Cast Iron Pipe Founders' Association, the object being "the advancement of the interests of the cast iron pipe trade, the promotion of good will and harmony among its members, the encourgament of uniform customs and concerted action, and the collection of all information on matters of importance to the business," also the proper division of territory for the trade at large.

This association failed likewise for want of cohesiveness. Thus it appears that both of the efforts to combine, above referred to, failed because of a few concerns either opposing or failing to join.

In my opinion it would have been of very great service to them had they been united and worked together. There would have been fewer losses, fewer foundries, less trouble and worriment, and more money for all of them.

In all financial, industrial and commercial affairs the order of the day is in the direction of co-operation and combinations in spite of all attempted legal restrictions, political denunciations or other useless impediments. Their object can be defeated only by their own indiscretion, such as unwise or over capitalization, or a demand for unreasonable profits. The whole movement is a result of the evolution and progress of the advanced state of business civilization.

Afterward, in commenting upon the condition of the cast iron pipe trade at the present, Mr. Wanner instanced the case of a recent letting at which the company representing the newly effected consolidation of foundries and an outside foundry were bidders, and the contract was awarded to the outside factory at a price, which was $2.22 lower than the other bids. After studying the condition of affairs thoroughly, Mr. Wanner was of the opinion that where an industry had in the producing capacity outgrown the demand for the product the only way to save the business was to form a combination.

A discussion on the question "Are foundrymen getting for castings prices consistent with the advanced prices of raw material? If not, why not?" brought out the fact that foundrymen in nearby towns were getting much better prices than the foundry-men of Philadelphia. The situation appeared to be somewhat improved, however, advanced prices being asked by a few foundrymen in the district.

That "Good Enough" Habit.

BY R. H. PALMER.

Setting cores in a mold is one of the points the foreman's attention is often called to, and one that often causes much ill-feeling between foundry and machine shop.

In every foundry there is a class of molders, hard workers, rushers on plain work, but give them a piece of cored work, and a great many times the cored hole is not quite in its proper place when the casting goes to the machine shop.

If the core does not cut through as it ought the molder will say, "Let the machinist drill it through."

They do not realize that that piece of work is going to cost their employer more than it ought, simply on account of their carelessness.

If it were said to them on the start "You are robbing your employer," they would open their eyes in astonishment, and indignantly deny it.

It is not done wilfully, with a wish or intention to hurt their employer's interest, but carelessly, and without stopping to think of just what the consequence is going to be; they simply know they are paid so much apiece for the molding.

In these days of close competition the molder can do much to either help his employer to make or lose money by the simple operation of coring castings. There are many jobs taken by the foundries where the holes could be cored, especially in building work, could the employer be assured that the holes would be correctly, but as he is not sure of this he goes to the extra expense of having them drilled when he can not afford it at the price he has taken the job for.

Now, while we know there are lots of careless molders, just as there are lots of careless people in every trade and profession, we know there is always two sides to a question.

In many foundries I have seen patterns furnished to the foundry where the core was supposed to be made to drop into a print, and core a hole in a casting perhaps 4 or 5 inches below the surface of casting in a flange, and stop itself off. Now look at some of these prints, and see how they are made. Suppose the core is ¾ inches round. The pattern has a plain end 7 inches deep, the core is to be 5 inches below the surface to the center of the hole. There are to be two holes 1½ inch each side center line to center of hole; the patternmaker gives the print 1-16 inch draught on each side, he then makes a core box to fit the print; the core is to stop its own print.

The coremaker is given the box, the pattern to a molder, with, "We want so many of this to-day."

Tom is a piece-worker, willing and good-hearted—a rusher in every sense. Willing to do all he can, but he has one habit—"That's good enough! let it go!"

As it goes, his will is good, he molds one up, gets the cores, drops one in and it does not go sliding down as it ought; it is tight; it sticks up a little above the joint. Tom files it off; boss comes along; "Do those cores fit, Tom?" "Yes, sir." Boss goes off; coming back that way in a short time he sees Tom filing a core.

"Tom, what are you filing those cores for? You said they fitted!"

"Oh, I had to file a little off the top; they stuck up a little above the joint. I was afraid they would crush."

Taking the pattern and trying a core on the print:

"Tom, this core is the right length, but it is too thick or fat near the bottom to go down to its bearing; file the core so"—(showing him how).

Now for the result:

Tom has filed off the tops of some a little, others more; he drops them in so the top of the core comes to the joint. Suppose you allow him to pour those molds as they are?

You may say I am "stretching it." Do you honestly think so? If so, look over your past experience.

When that casting comes to be bolted on to another what is the result?

The core not going down to its proper bearing, say 5⅜ inches below the surface, and being short ⅛ inch of that amount, this casting is not up where it belongs by ⅛ inch, or its surface is ⅛ lower than the others. Suppose the core in the other casting is down a little, say 1-16 inch. How is it then? There is a howl!

The machinist goes to put the castings together.

Its "d—n the molder!"

The foreman molder is called in and shown the castings; told they are not cored aright, and how much it is going to cost the machine shop to clip those holes, all on account of that infernal molder, and the foreman cannot deny it.

If he says, "You will find, say, two of them wrong, as I found the molder had set the cores wrong, but the rest I am confident are right as I showed him how I wished them set," and perhaps helped him set a part, the chances are he will be told, in some shops, and by some bosses, "We've tried them most all, and they are all alike."

Then there is a howl sure. If the foreman molder sticks to his text (and let me say, pull out your rule, see if you are right, and if you are, stick to it). If there is to be a howl, have it; on the other hand, if you are wrong, own it up like a man, but take my advice, don't let Tom pour those pieces; don't let the "good enough" habit take a hold. If you do your men will all have it, and you will be in hot water all the time.

I know it would take some time for Tom to take those copes off and change those cores, but don't you think it would have paid.

Tom, you have probably been told of the howl, through your "good enough" habit.

If you really mean to correct this habit, let this experience help you; remember it the next time you have cored work.

You are a good fellow; you mean to do right; but you have fallen into that miserable habit. You have a faculty of weaving up work so it will just pass inspection; you handle a lot of iron; you are a necessity on some grades of work; your boss likes you, he knows he needs you on some work taken at the cut-throat prices of the day, but when work is a little dull, are you not one of the first ones to be laid off, and why? because your foreman has got into a number of scrapes trying to give you better work than you have been accustomed to doing so as to keep you, and do better by you, and so as to have you for your regular work when it comes in. He has tried to show you and impress it on you that you must take pains; but you know you have the "good enough" habit, and it is a curse to yourself, your employer, and everyone you come in contact with, and especially to the machine shop that handles your work.

Suppose we look at that core print; is there not something that could be bettered there?

I have had it said to me in the pattern shop, "Why, that has got a 1-16 inch draught to it, and that's a great deal."

Yes! so it is—in some cases.

On many patterns it means a great deal, and the more unnecessary draught added the more weight perhaps, but should you make a core print with as little draught as possible because you do a pattern?

If it is a print that is to take in a core that is to stop off its own print, the more draught you give that print the more you are to have the core come to a bearing as it ought; and right at this starting point much evil can be avoided.

I have always found pattern-makers, as a rule, pleasant and obliging, and the chances are ninety and nine out of one hunderd if a foundry foreman sees a pattern is being made, and sees some little point that will be for his advantage in molding, to have changed and calls the attention of the foreman patternmaker to it, provided he does it in a proper way, he will be very apt to have it done for him. I have had changes made for me many times, but remember, courtesy and being pleasant go a great way; again, suggest, don't order; and if you wish favors be ready and willing to grant favors yourself.

Many a patternmaker likes to take a trip into the foundry to see how some of the work is done.

A good patternmaker takes as much pride in his pattern as any man can in what he makes, and how well that pattern works makes all the difference in the world to the profits of the foundry. Many a time I have been asked by a patternmaker how some particular pattern worked.

I remember a man's making a saddle pattern for a locomotive, and when it was molded it drew out of the sand leaving a clean mold, not all broken up. When the cores were set in place they fitted, and no filing was required. In fact, the foreman was so pleased he sent word to the foreman patternmaker asking him to come in to the foundry, and showed him how nicely everything fitted. The only reply was: "The man was long enough making it." Yet the extra time spent in making this pattern was far more than compensated for by the consequent saving in the foundry and machine shop.

That patternmaker was holding a good position the last time I heard from him. Evidently he had not formed that "good enough" habit.

His present employers pay for brains. So I am inclined to think he gets a different kind of compliment now.

No matter how good a man they have over them, they like to ask questions in the foundry, and when they see any need of changing their way of working they are sure to do it willingly and gladly.

Take my advice, foreman molders, answer all of the questions they ever ask. I have found them good friends.

Many a firm that has been running at pretty nearly a loss, barely making both ends meet, would make something if they could stamp out that "good enough" habit, and also the fact that many times there is a pull and haul between foundry and machine shop. Does it pay? I think not.

It is terribly trying for a machine shop to have a beak down job and take a casting from the foundry, and after having spent some time on it, find it no good.

Does it help matters any to rush out to the foundry, with "That's a fine casting I got! The infernal thing is no good; haven't you got a molder that can make it?"

The chances are there will be a few words! Has that man a right to come in that way?

Yet to hear some men go to a foundry foreman, one would think the foundry occupied the position toward the machine shop that one football team does to another and that the foundry foreman was the football.

Both are supposed to be working for the interest of their employer. Is this the proper way? On the other hand, if the foundry foreman knows it is a breakdown job he should, and probably will put the best man he can on it, and give the man good iron.

If the casting comes poor it certainly is no source of joy to him; there is no glory in poor work, and it means the loss of position if occurring too often.

Any man having occasion to visit a foundry often will see a molder at times poking around some casting, scratching here and there, in reality looking for what he doesn't wish to find.

You see a man here who is a careful and painstaking workman. Is it right to confound him with the fellow who is careless, and who takes no interest in his work only to make it so that it will just pass?

Or to say of molders, "They are all alike?"

They have not by any means all got that "good enough" habit, and, Tom, see if you cannot get those cores where they belong, and show your employers that your "good enough" habit is a thing of the past.

What They Say.

You can always depend on my subscription so long as I can earn a dollar.

JAMES STEVENSON,
Salt Lake City.

THE FOUNDRY

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Trade Outlook.

There never was a time when the demand for foundry product so far exceeded the possible supply as at present. The continued rapid expansion of business is a peculiarly fortunate circumstance to such founders as took large contracts at the low figure prevailing at the beginning of the year; for, while it may be impossible to make a profit on this part of their product, the ample profit on current business will go far towards compensating therefor. It is generally believed that the buoyant condition of industry will continue for twelve months at least, but the opinion that a reverse will follow sooner or later is quite as common. This latter opinion is based, of course, upon past experience. So accustomed have we become to the ebb and flow of business conditions, that most people take it for granted that there is no possible escape therefrom. If any man should express a doubt that this country will be again plunged into the abyss of industrial stagnation he would be laughed at, for everybody knows very well that it will be.

This is not a fact to be proud of; indeed, we are of opinion that if the master minds of the present day were given as much to the problem of maintaining an equilibrium between supply and demand as they are to that of personal gain, it would soon be solved.

An intelligent statement of the business outlook cannot be predicated solely upon the apparent demand for product; for that would be simply to state that which is, and not that which may be expected. The impetus that started the present "boom" was produced by a sudden great expansion of the export trade: hope, and confidence in the immediate future sprung from this. Writers upon economic questions well know that confidence is a factor of tremendous potency in creating business. But too much confidence, and too little wisdom in the conduct of affairs, leads to very disastrous results. Our confidence has already carried the price of pig iron to so high a point as to greatly diminish the foreign demand. THE FOUNDRY foresaw the probability of this before it transpired and pointed out the danger in these columns.

To have bought heavily at the time that the upward movement began would have been the part of wisdom; but, to stock up largely on the crest of the boom would be the height of folly. There need be no further advance in the iron market, and there might be a considerable decline, with positive benefit to all. A net profit of one dollar a ton on pig iron is too much; but when this profit is multiplied several times as at present, it is in a high degree injurious to all other interests, and, in the long run, to the pig iron producers themselves. As we said several months ago, given a fair profit, any further advance in price, except to cover possible increase in cost of production (that is, increase in wages, either local or general), is wrong, is disruptive of a healthful balance of industrial conditions, and cannot be long sustained. In reviewing the business situation at any given period it is often extremely difficult, but at the same time of the highest importance, to avoid confounding cause and effect. A highly esteemed contemporary, who is very optimistic with regard to the present outlook, avers that we need not expect another period of depression to result from such concurrent circumstances as caused the depression of 1894; and, among other things that are named as causes are, the falling of many railroads into the hands of receivers, and concurrent destruction of capital; the decline of real estate booms and the fall in value of connected industrial concerns; destructive competition in a leading industry.

which resulted in extremely low prices, and the putting into operation of highly productive manufacturing plants.

The first and third of these were, plainly, effects of business depression, and not causes thereof. The bursting of real estate booms may be classed among the prolific causes of hard times following; but an increase in productive power as represented in improved manufacturing plants, ought, it seems to us, be classed as one of the most beneficent forces that make for prosperity. The basis of prosperity in manufacture, is the power of the masses to buy. If all those engaged in agriculture shall succeed in getting the true average price for their products, the demand for agricultural machinery will exceed the supply; but, if cliques of "financiers," speculators, and other sharpers shall succeed in wheedling the farmer into selling his products at a ridiculously low price, the bulk of the profits of agriculture will go into the pockets of the members of said cliques, who do not need any agricultural machinery for their business, with the inevitable result that honest industry will suffer. The same rule applies in every branch of industry; that is, if the income from the aggregate product of industry shall be equitably shared by all classes, from the managers of the giant consolidations, all down the line to, and including, the common laborers, then will prosperity continue without end; but, as long as individuals and minor groups of men shall, in times of growing prosperity, divert an excessive flow of the common product to themselves, the alternations of prosperity and adversity will not cease. In view of this fact, the obvious power of the wage-workers at this time to command a share in the nominal rise in values is the most fortunate of circumstances for the very men who have to pay the wages; for only by increasing the general purchasing power can the stress of competition be diminished; for, it is not the cost of labor that defeats profit-making, but competition among profit-seekers.

For the present there is nothing of menace in the business situation. It has been feared that the trusts, or consolidations generally would use thier undoubted momentary power to arbitrarily advance prices greatly beyond what would have been under free competition. But this has not been done. And that it has not, indicates the probability that the heads of these gigantic systems are more profoundly versed in economic law than the general public suspects, or can appreciate, for that matter.

As we have said before, the great consolidation is, per se, the highest, most advanced form of industrial development. Whether it shall prove the best, not only for the general public, but for its own members, will depend upon the per cent of profit. If this be too large, inevitable ruin will result; if only a good, fair profit be taken, all will be well; nay, all will be far better than most people can imagine in the light of past experience.

As an instance of due moderation of one of the consolidations, the bids on supplies to the Detroit water board may be given:

Iron pipe—A Chicago firm bid $25.00 per ton; a Philadelphia firm, $24.90; the American Car & Foundry Co., $23.50.

Special castings—A private firm, $2.20 per 100 pounds; another private firm, $2.50; American Car & Foundry Co., $1.68! Thus, the trust, so-called, bid $1.50 less per ton on pipe, and 82 cents less per cwt on special castings than either of several concerns unconnected with any consolidation.

The simple difference in bids in both cases would constitute an ample profit. If the American Car & Foundry Co. is paying as high wages (and we have no knowledge to the contrary) as its competitors, then it has here shown itslef to be in harmony with public interest, and it merits success.

Their Business Booming.

The Chicago Pneumatic Tool Co. writes us that their business for March was the largest in their history, being more than double that of March '98, and the increase for April is still more marked. Their orders are very largely from users of pneumatic tools who wish to increase their use of them.

The S. Obermayer Co., manufacturers of foundry facings, Cincinnati, O., and Chicago, Ills., have installed in their Cincinnati plant one of the most extensive laboratories in the west. The apparatus in the laboratory is peculiarly adapted for their business, and we dare say there is nothing like it in this country, as most of it was imported from Germany and other countries where such is used for similar purposes.

Catalog No. 1 of the equipment department of the S. Obermayer Co. has reached us. It is of standard 6x9 size, well printed, on coated paper, and contains something over 100 pages, four of which are occupied by the index. The illustrations are numerous, occupying a portion of nearly every page in the book. We mention a few of these, which will give an idea of the great variety of foundry facilities that are handled by this great house:

Cupolas, blast gauges, fans and blowers, blast gates, ladles, including hand, spur and worm-geared ladles, the larger ones for crane, truck or stationary operation, trucks and turn-tables, brass founders' furnaces and flasks, core ovens and sand sifters, tumbling barrels of many different styles and sizes, etc., etc. It would require a book to tell the whole thing. They handle cranes of various kinds, jib and traveling, testing machines, snap flasks, etc. The book also gives price list of facings, blacking, etc., and a good many useful recipes and tables are also given.

This valuable book ought to be in the possession of every foundryman.

What is Vitriol?

We are led to publish the definition of this word, because, we recently received a letter from a subscriber, in which he informed us that, having read an article in THE FOUNDRY on pickling castings, he had procured some vitriol and tried it with unsatisfactory results, and he wished to know what kind of vitriol to use. The fact is, he had been using the soluble sulphate of one of the metals instead of sulphuric acid. Vitriolic acid, and oil of vitriol, are the old popular names for sulphuric acid, but they are wrong and misleading. Sulphuric acid is formed by one equivalent of sulphur and three equivalents of oxygen. Vitriol is a solid, while sulphuric acid is a liquid. Foundrymen have no use for vitriol, but every foundryman ought to use a solution of sulphuric acid for work that has to be machined.

How to Use Plaster Paris.

BY OSCAR OLDMAN.

Plaster paris is one of the most useful of all substances to the foundryman who knows how to use it. It is much used in the making of followboards, but there are other materials that may be easily substituted for this purpose; but, in making some kinds of patterns no other substance approaches it in ease of manipulation or in economy.

To get just the right proportions of plaster and water requires considerable experience, but there is a good range of latitude permissible, and anybody can mix it, after a few trials, well enough to make its use quite practicable. The proportion of water depends much upon what you wish to do with the mixture. If you wish to build up a mass of it, something after the fashion of modeling in clay, the mixture must be thick, of course; but not so thick as with clay, for plaster sets very quickly when but little water is used, and it must be handled with great expedition, or it will "set" and the unused portion will have to be wasted; though an expert will be able, by working very rapidly, to add water, and so gain time to some extent; but, after it has once become hard, it cannot again be used.

Patterns for chills are made in plaster to exactly fit the face of the pattern where they are to be used simply by casting the plaster upon that part of the pattern. Suppose you wish to make a chill pattern for a plow point.

First, provide a box about eight inches deep by, say 20 inches square, more or less, as you please, but be sure to have room enough. Now fill this with hardwood sawdust, which should be first sifted through a No. 8 riddle. Wet the sawdust so that it can be built up into a vertical wall that will remain in position. Now, oil the share pattern where the plaster is to come in contact with it, and imbed it bottom up in the sawdust, and, using a small, thin board, build a wall of sawdust around the space that is to be chilled, and make it high enough so that the plaster cast will be an inch thick at the thinnest place. Provide for a quarter inch of stock on both sides, and an inch at the small end. The point chill, when finished, should extend beyond the edge of the share about ¼ inch; at the tail end, 1½ inches, and on the land side of the nose it should be ½ inch thick.

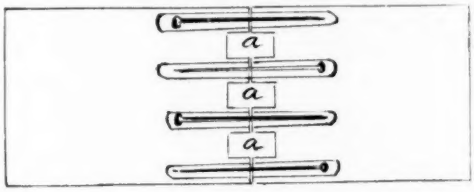
The edge of an ordinary one-horse plow should be chilled back to about ⅝ inch; of a two-horse plow, ⅞ inch. Anything wider than this on any plow is superfluous, and adds to the difficulty of casting. Having

gotten the sawdust mold shaped to suit, mix a quantity of plaster to a consistency between thick and thin, and pour it. About an hour hence (and in less time when you get used to it) take up your plaster cast and scrape off the adhering sawdust, and, with a small hand saw, trim to something like what is wanted, though taking pains not to cut too close. The rest of the work must be done with a wide, thin-edged chisel, smoothing, at the finish, with sand paper, though never touching the face side.

The chill for a two-horse share should be half-inch thick at each end and ⅞-inch at the middle. Let the finished pattern dry over night, and, before molding, next day, try it on the pattern and see if it fits perfectly. Plaster paris will change its shape sometimes. I never knew but one man who could make a chill pattern of plaster for a plow mold that would never warp; in my experience they sometimes warp, and, therefore, it is always best to try them before molding. This is done by mixing a little red lead in oil and painting the share pattern on the edge, and then, carefully laying on the chill pattern and moving it a trifle so as to cause the paint to adhere where it touches hard. This is a delicate operation, and the novice is apt to make the mistake of bearing down too hard in trying the pattern, thus bending it, and causing it to touch the paint where it ought not. Bear this in mind and you will have no trouble. If the plaster pattern does not show paint pretty evenly all over its face, it must be carefully scraped, in such a manner as not to materially alter the proper contour, and the operation of trying and scraping must be repeated till a fit is attained. Do not varnish the chill pattern; mold carefully so as not to spring it in the least, and draw without rapping; simply thrust the finger nails into the edges and lift; this will give you a perfect mold, which should be set upon a solid bed, previously prepared, in such a manner as to preclude the possibility of warping. Gate it at the end. The casting from this mold should fit the edge of the share pattern almost perfectly; and if it do not, it must be made to, before fitting up for a pattern.

MENDING PLASTER CASTS.

Plaster casts, if they happen to get broken, are very easily mended. The illustration shows the method, which may be varied according to circumstances,; a a a represent saw curfs made in the edge of the fracture at points opposite each other in both pieces of the broken plaster cast. There are four grooves gouged in the pieces, of sufficient depth to permit of a nail being laid in each wholly below the surface. After placing everything in position, as shown, wet the nails and the plaster at the grooves and the fracture, and then apply very thinly mixed plaster, and continue to add to it till the



whole is filled up evenly to the surface, and all is solid. Let it lie without moving till dry. If the cast is thick enough, and it is desired to make an exceptionally strong mend, lay in some nails on the opposite side. Such a mend as this, if well done, will be the strongest place in the cast, of equal section. When important patterns are of such shape and dimensions that, if broken, it would be difficult to restore the shape exactly, there ought to be a plaster form cast upon them, which is done by exactly the same method that is employed in making a plaster follow-board. Where this is done, though the pattern should be broken into many pieces, the original shape can be restored perfectly.

Small, light patterns, of very irregular shape, can be easily and quickly made of plaster, at a nominal cost as compared with wood patterns. For instance, suppose it is desired to make a bracket pattern, to connect two or more irregular surfaces, requiring the bracket to be ⅛-inch thick and not over 5 inches long. Set up the objects to be connected, in the exact position desired, oil the surfaces and inclose the intervening space, and pour in plaster. When the plaster becomes set, and sufficiently solid, remove it carefully, and cut away the surplus of plaster, giving it any desired shape, and you will have a pattern at very little cost, that, made in wood, would be expensive. Of course, a metal pattern must be taken from this as soon as possibe.

In making such patterns of very large dimensions, the principal parts may be made

of wood, and plaster used only at the fitting points.

There are many ways in which plaster Paris may be used with great economy in the foundry, most of which the man who once becomes accustomed to it will find for himself.

Useful Foundry Hints.

BY R. D. MOORE.

Evaporation, applied to foundry practice, is an interesting study. The drying power of a core oven depends on the amount of cores in the oven, or rather on the amount of evaporation.

A potash kettle weighing over a ton was lost by the dry sand mold being extremely green, although in the oven 44 hours, that length of time being found ample for drying each of 100 other similar molds. A heavy Sunday rain had found a new leak through the wall and saturated the whole floor of the oven, adding greatly to the amount of steam generated.

A half core for a 40-inch Scowden valve chamber for a water works presents an interesting case; the core was 4 feet wide by 9 feet long, with a tapering thickness averaging 7 inches. The skeleton was cast iron with wooden scantling bolted on the sides to give shrinkage room as they burn out, and room for the expanding rod.

The core was run into a very small core oven alone, and fired by a night watchman who did not heed a little thing like his special orders about light firing. The next morning the wood in the skeleton was burned out and the core sand burned black.

The two cases cited illustrate the two extremes of high and low evaporation, which it is important to consider, in both features, as both lead us onto dangerous ground.

A HINT ABOUT CONES.—I was, very early in a long foundry career, impressed with the "hap-hazard" manner in which stock cone prints, and core boxes to match, are made.

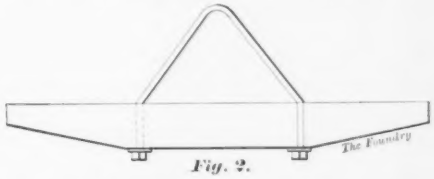


Fig. 2.

Every patternmaker makes either of any length or angle to suit his fancy at the moment, whereas, every shop should, at the start, adopt a rule to secure uniformity, that every one-inch core, for example, shall fit every one-inch print. It may be proper to hint, in this connection, that a cone print should be larger than the cone of the core box, especially at the bottom, to prevent the fit being dangerously tight; 1-16 inch in a ½-inch cone, graduated to ⅛ inch in a 6-inch cone, is about the proper allowance.

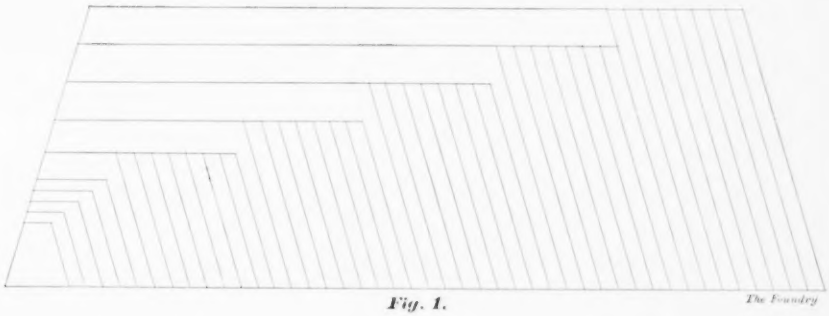


Fig. 1.

The old saying that, "better late than never" do good, may very properly be adopted in all old shops, as with such a rule all future work would be properly done.

About 30 years ago I made a rough pencil sketch, to see how it would look, as a rule to work by, of which Fig. 1 is a copy. It shows about the right proportions, but can be varied to suit different views of length or angle. Such a sketch, in ink, correctly lined, varnished to a board, and varnish coated, could be easily measured, and would last a lifetime.

A LIFTING BEAM can be made very cheaply and preserve nearly the highest strength of the wood, as shown in Fig. 2. For a 12-foot beam a piece of oak 6 inches by 12 inches, or more, a 1¼-inch round bar 7 or 8 feet

long, with a nut tapped on each end, then three easy bends of the bar, as shown, two thin wrought iron washers, and you are ready for a very short carpenter job for the lightest and smoothest beam, not a pound thrown away. We once handled a six-foot beam that for extra weight to handle, waste of iron, and blacksmith's labor, became a curiosity. The stirrup commenced at the top with a six-inch ring; to that was eye-connected, two links; to these were joined two other links, one end passing through the beam to the nuts below. We have here five separate pieces of forging, seven unnecessary welds, adding greatly to the needed metal, and weight. One can easily imagine what a "dutch puzzle" would be the job of placing those links through the beam at an angle of 45 degrees! They never did get them to their places, but left a kink at the top of links. These irons were made of 1⅜-inch bar; double the necessary strength.

ROLLS, ETC., IN DRY SAND.—The writer has noticed a singular feature in the behavior of dried molds, for rolls, or shafts, made in iron flasks, to be cast upright. Although the pattern may be perfectly round and molded carefully the casting will be found, to some extent, oval. It is not strange that the casting is enlarged in one direction, that is, up and down as molded, by the hard, dry parting not coming together perfectly, but the calipers may show a considerable reduction of the theoretic diameter, at the parting, below the size the measurement of the pattern would promise, with shrinkage allowed.

There is both probability and proof that the skin of a dried mold, faced with a wash, and thereby toughened, will shrink in the process of drying slightly more than the body of the sand, which would give the skin a perceptible curl inward at the parting; a fine spun theory, but justified by the facts.

Another thing occurring in a mold dried in an iron flask may assist in reducing the diameter at that point. When the flask becomes expanded by the heat of the oven there will be a tendency in the sand to maintain its size and shape, or, in other words, the expanding flask may separate from the sand in a slight degree, at the sides: when the flask becomes cooled again and shrinks back to its original size the dry hard sand will be forced in at the joint a trifle, adding to the distortion from the former cause.

A paper mill roll, molded from a new 12-inch pattern, showing light turning allowance, in addition to shrinkage, was so reduced at the joint as to be slightly under the finished size, when cast, but showed plenty of turning allowance up and down. Thereafter the size was secured by a trowel shave, commencing at a straightedge set back 3-16-inch on the joint, and reduced to nothing at 4 inches down from the parting. To prevent the enlargement of such molds, up and down, the writer practiced a liberal sponging of the drag parting immediately before closing, with good results.

POCKET CALIPERS.—Every molder, and especially every foundry foreman, should carry a pair of pocket calipers about four inches long, and not over one-sixteenth thick, which, if properly shaped, will span a shaft 5 inches diameter. They can be made useful in a variety of ways outside of their regular use. They are very convenient for setting core prints on wheel hubs, etc.; sufficient accuracy for the purpose is secured in a very short time.

They will be found very useful, and always ready, for hooking hot iron out of a wooden flask joint, immediately after a run out, and before setting hard. The writer has used them for the latter purpose a great number of times, effecting a considerable saving of flask joints.

Pouring Under Difficulties.

BY P. R. RAMP.

A job very often comes into the foundry that taxes the ingenuity of the man in charge. Sometimes it is owing to the lack of equipment, such as cranes, ladles, etc. We recently cast a corliss engine fly wheel, weighing 40,000 pounds. The size of the ladles that we had to pour it with were as follows: One 7-ton, two 5-ton and one 3-ton ladle; four in all. The wheel was molded where we could reach it with but three cranes. The runners were built, leading to the hub of the wheel. One of the 5-ton ladles full of iron was picked up by crane No. 1, the 3-ton was carried by crane No. 2, the 7-ton ladle was filled and placed a short distance from the runner. When the other 5-ton ladle was full (making 20 tons in all), it was picked up by crane No. 3, and the

metal was poured into the wheel. As soon as the 5-ton ladle on crane No. 3 was empty the 5-ton ladle on crane No. 1 was poured out, quickly followed by the 3-ton ladle on crane No. 2. In the meantime crane No. 3, having been relieved of the empty 5-ton ladle, caught up the 7-ton ladle, swung it quickly into position, and the pouring was therewith completed without once permitting the iron to get too low in the runner. The time occupied in pouring this 40,000 pound casting did not exceed three minutes.

Reverberatory Air Furnaces; Malleable Practice.

BY E. C. WHEELER.

The straight draft air furnace as constructed to-day, differs but little from the lines of same furnace built twenty-five years ago. There is still in use at various points in this country many of these old time melting hearths, built in a time when there was no necessity for purifying or refining the initial charges, for the charcoal iron of days gone by has made the reputation enjoyed by present production. During the past ten years the malleable concerns have been wrestling with coke iron, and the result is, that to-day it is as acceptable in many localities as its former great rival, charcoal. These irons varied so greatly in physical complexion, that the question of substitution was very weighty, presenting as it did, a problem of intricate solution. That this change has been made, and successfully too, is evidenced in the superiority of articles now cast. With this almost radical change in pig iron, there has been no similar and contemporary movement regarding melting furnaces, for they are still the same unwieldly heat-wasting constructions as of old. It is not beyond the limits of sound reasoning to anticipate some change in the near future bearing in this direction, offering relief to some concerns, whose best working cannot show below fifty per cent. fuel to one ton of iron charged. The pig iron market to-day is in anything but a healthy condition; iron is at a premium. Consequently blast furnaces are producing beyond their supposed capacity, with the knowledge that anything resembling iron is marketable, and during this rush, quality may sometimes be overlooked for quantity. The malleable producers are still offering, regardless of these negative features, a uniform article comparing favorably with former years, and it must be admitted by consumers that there has been no falling off in this direction regarding quality of production.

All persons at all conversant with iron are familiar with the appearance of an air furnace. A long, narrow sluice-way through which flame from fire-hole at rear traverses under pressure, finally finding outlet through stack. At the first glimpse there is certainly nothing wonderful or complex, as to its construction, it being the most simple arrangement possible. Probably this latter statement will cover the question often asked, why not try and improve this furnace? Appearances are, however, deceptive! In changing the few simple lines of furnace, there is no vouching for the results which may be directly consequent. There are, of course, many varying ideas about the furnace, but none differ in a genuine radical manner. In considering this furnace we will begin with the fire-hole, and finish at top of stack. The question of square feet contained in grate area, arises with the building of each new furnace. Will the tendency toward enlargement of fire holes prove the benefit anticipated? There is great bearing upon this one point. The claim is often made, that with this newly acquired grate, and head space over same, there will be a chance given for the proper assimilation with the flame, of enough oxygen from blast, to throw over bridge walls a clear and continued oxidizing flame during the progress of heat. There seems, however, but one opportunity for this desired flame to generate, and that is when the heat has been melted down, and the flame is encountering the rising heat from metal, due to the latter freeing itself through the burning off of its latent heat, or silicon, and it is during this period that the flame works upon the carbon content of charge. With the enlarging of furnaces, there has followed in certain ratios, an increasing development in fire holes, to produce enough flame to fill furnaces, and the principle of head room over grates has been, for the accumulation of enough flame, that, when blast is on, bridge opening will be full. The idea is advanced of curtailing this superfluous head-room, and, instead of a flat "bung" roof, placing an arc toward

bridge. The blast entering under grates from the bath or furnace end of fire-hole will drive the flame with much less pressure, and effect better combustion. This will necessitate the lowering of fire-hole about one foot. With this proposed arc roof and the lower pressure of blast required, we will, in a measure, again approach the metal made years ago, when natural draft was the only means of firing, and this will not be retrograding in any sense of the word, for the furnace will be improved thereby and iron after annealing will have a deep black fracture, so prominent a feature in the early low pressure malleable. In fact, in many of the old hearths no pressure was used. If molders could be provided with floors large enough to accommodate a day's work, low pressure or natural draft could not be advised too strongly, but in most foundries the ground space is always at a premium, thus requiring pouring off more than once per day. To have large heats ready to tap in short time requires that the firing and blast pressure be high and constant. Low pressure of about 2½ ounces allows the silicon and carbon to turn over almost naturally. High pressure above 5½ ounces fairly tears the molecular conditions and renders iron liable to be burnt quickly. A great amount of trouble which arises comes from the fire-hole end of furnace in quality of coal used there. There is absolutely no economy in cheap fuel, whose ash is above fourteen per cent., for, it can be depended upon, something will be sacrificed. When a poor quality of coal is being used, how often has the furnace help pulled the cinders from same out of the slag hole, instead of shovelling from under grates. The heat is also slow in coming up, and, when in this latter state is more likely to absorb sulphur from the fuel, than when working hot, as cold metal like a sponge is fast absorbing impurities on account of all its tendencies working toward "suction," while with hot metal every energy is toward "expulsion." These facts are demonstrated daily in all foundries, but there may be some whose notice they have so far escaped. The coal which will produce best results is one originating from the decomposition of resinous or fatty woods, or similar vegetable decay, giving a volume of flame, not possible with a lean coal. The space below grates should be large enough to hold the cinders from a day's working, without interfering with the blast.

For an air-furnace to melt ten tons there should be at least thirty square feet of grate surface. This will allow the bed of coal ample time and space to volatilize itself, without the loss of heat generally run to ash. Blast with a uniform pressure of three and three-quarters ounces will, with coal of this description, generate a perfectly white flame, when metal has started to oxidize. There is great bearing on question of blast filling the fire bridge opening, and corresponding one at neck of furnace. If these openings are too large for bath so much higher will pressure of blast be required to successfully fill body of furnace with flame. The neck opening must be just sufficiently large to clear furnace of smoke, without clogging it; if this space is excessive, the blast will be used to fill stack. The fire wall bridge does not carry this responsibility, it serves rather to direct the flame upon metal at right angle, to reduce pig iron rapidly, and then carry on the oxidizing influences. There seems no doubt that half of the coal charged into fire-hole is wasted as smoke, not volatilized, on account of the pig iron, when first charged, chilling the furnace to such a degree as to render combustion an impossiblity. After the furnace is thoroughly heated coal is then giving its almost entire energy toward combustion. In this connection it might be well to say a few words concerning producer gas. That there will be a modification of present air furnace is the promise of a near future, rendered necessary by the economic handling of a plant. If producer gas is to be used the percentage of coal to ton of metal can be brought down to twenty-five. This latter figure is no guess, as the writer has had actual experience covering two years, melting with producer gas on malleable cast iron. Whether the furnaces then operated were quite the proper solution of the problem is a matter for consideration, but at any rate a modification following those lines will accomplish the anticipated results. With the advent of electric distribution of power throughout plant, the first place of advantage should be the placing of blower close to furnace. The ideal location of blower is upon roof of building directly over furnace, a small house enclos-

ing blower and motor. The switches may be placed convenient to fireman. The air thus pumped will be fresh, containing more oxygen than foundry atmosphere. There will be no loss in volume, which is prominent when blowers are some distance from furnace, as blower pressure, and compressed air vary in this particular. With present high efficiency in motors the chances for burning out are very small indeed, requiring only engineer's attention for oiling. With a pressure gauge at each furnace, the speed of blower may be regulated accordingly. This economy in power over the shaft driven belted blower is only too apparent. The placing of air duct under grates also varies with localities; some bring the air directly under fire door, some from furnace end, and not a few divide the air volume, oringing it in from opposite sides. The best position for flue would be directly under fire grates, but this, of course, is not practicable. There is no draft like a natural one, when quality is the first consideration. Even if it were possible to introduce into stack some suction draft, it would prove beneficial in localities where charcoal iron is still used exclusively. When the matter of fire-brick for walls, bungs and fire-hole is concerned, we venture upon a subject the importance of which is lost sight of in many foundries. There has been but little improvement in fire materials during the past ten years. We have tried many varieties, but the same old boring of the flame, and the long furrows on side walls, coupled with the melted roof, are as prominent as ever. As a furnace is repaired at least once per week, the magnitude of fifty-two repairs cannot be underestimated. This is a large item in foundries where three or more furnaces are in operation. Everyone is, or should be working toward economy; it is owed to the individual proprietor to produce material at bottom figure. With fire-brick there is still a great field for experiment. If fire-brick could be manufactured from a mica-schist rock, the writer would beg to anticipate a different condition of furnaces after a week's hard usage. When Bessemer steel molders are lining convertors fire-brick is never considered; it cannot stand the wear and tear incident to service.

Appreciating the rough handling an air furnace receives, why would it not be practicable to work into bricks, etc., a substance, the resistance of which to fire is daily proven. A furnace lined with brick composed of mica-schist would last three months on the one lining. Better than all, a bottom could be built of the native stone, and if, when charging, a few pieces of cord-wood were thrown on same to prevent pig iron breaking through, it would give as continued service as the walls. After many trials covering considerable territory the writer realizes that the successful fire-brick is yet to be projected. Some are merely better than others, in matter of cost. The lines of furnace proper, or melting hearth, have not been changed in many years, the straight flue being best practice by general verdict. One of the most successful furnaces, however (in which the lines were different) which the writer has operated, was one in which the lines of blast furnace were followed, upon a small scale. The width at fire bridge wall was three feet six inches, and at "bosh" or widest point six feet, this point being four feet from fire bridge. The furnace tapered from bosh to neck opening, and width over latter wall was three feet. At first note it might be thought that flame would shoot through furnace, and not catch iron at widest point, or "bosh," but actual practice did not develop this tendency. This furnace handled seven tons raw material in three and one-half hours on a coal consumption of (34) thirty-four per cent., which was, and is still, the best figures writer has had during experience. The charge was not placed in one huge lump, but two charging bungs were used, both operating at once, thus distributing green material all through furnace. The class of work poured was very small, requiring hottest metal, and this furnace certainly produced some very fair iron. There was a tendency to burn off side walls near neck opening, but this was remedied by the changing of slant in fire bridge wall. An air furnace should have doors large enough to charge pig metal on "peals;" very often it is necessary to hold heats longer than anticipated, owing to molders' floors being slow; at such times metal could be added with some degree of security. The using of blue-glasses ought to be advocated, and used more than at present. It is, of course, very clever to judge the iron by the eye, but at times when one's organism is out of plumb, the eye is deceived. With little practice the

glasses prove indispensible, as they are always accurate. The height between metal and bungs when metal is all liquid will depend in a great measure, upon the width of furnace in accommodating charge when cold. There is no reason in heating superfluous space. It may be a surprising fact, but nevertheless true, that some furnaces have three and four feet in the clear. If the furnaces are built wide, and with a lower roof, the flame will be very apt to cling to metal, instead of following roof-lines to stack, and this may in a degree account for the low consumption of coal in the furnace already mentioned. The only reason for head room, and only moment it is used, is when furnace is freshly charged, It means more for maintenance than the furnace suggested. To effect better combustion of fuel, blast has been introduced into furnace at various points with the expectation that uniting with flame at these places it would volatilize the smoke. In a measure it has been successful, the results being gratifying, but at same moment it would be well to mention that life of fire brick is seriously affected, on account of the excessive heat thus generated. The favorite point for this secondary blast has been over fire bridge, where the "bung" has been perforated for a series of small pipes. This practice has not been uniformly successful, having a tendency to oxidize and combine carbon in metal before same is hot enough to tap, thereby running iron very high and thus sacrificing fluidity.

A rather novel experiment was tried some time ago, when air was introduced into fire wall above grates, a few inches from roof, the air passed close to roof and united with flame at the bridge. It demonstrated much better than where air was put through over the fire bridge. The pressure was medium; in fact, light, as it was believed that the heavier pressures only intensified the oxidizing influences, without the beneficial combustion claimed.

There appears but one sure solution of the combustion question in air furnaces, and that is "automatic stoking." This latter plan will cure all these existing defects when adopted. Automatic stoking may be perfectly regulated when heat is freshly charged and green, the mechanism will be adjusted to this condition, and when melted down the stoking will be faster. All coal charged will be reduced to ash, and greatest efficiency thus developed. It will also curtail furnace help, and even though it should not accomplish this latter feature, the saving in coal per ton charged would recommend its adoption.

In these later days of economy, when question of help is being considered, the end is sometimes reached with the sacrifice of some essential quality. Here the end may be gained with increased confidence. Is it practicable? The smoke would not issue from stacks as at present, being thus converted into heat units.

With the facts and figures of the past years ever before them, it is a source of wonderment that furnace builders do not use the shorter form of stack. When plants are isolated from the city limits, or in small towns, a 25 or 30-foot stack with forced blower draft back of it will be in every degree as satisfactory as an 80-foot stack. Of course, in cities where the smoke must be carried off, this cannot be practiced. In a boiler house installment a small blower will do the same work as a 200-foot stack. It is general practice to cover hearth of furance completely over with nine-inch "bungs," with the exception of a large bung for charging purposes. The reason for these small sections has been the rpadity with which they could be handled, and removed during repairs. The economy, however, in small bungs has yet to be proven. There is no substantial reason why the furnace cannot be covered over with eighteen-inch sections, and thus have a roof comparatively straight, offering but small resistance to the flame of blast. Every time small bungs are removed, the edges become more or less chipped, making a clean joint impossible, and allowing flame a chance to attack same at just these points. The wide charging bung with all its hard usage outlives the smaller sections three to one. With the improved differential hoists now purchasable, the extra weight cuts no figure whatever. The roofs of open hearth furnaces last, with good handling, nine months or a year, as they present no projections for flame to catch. The same principle is applicable to air furnaces. This is merely one of the many practical economic suggestions abount foundry. Fire brick is not the cheapest commodity in foundry business.

The waste of iron in slag, furnace bottoms, etc., is great enough to warrant some attention in every works. It is impossible to skim a heat and pull out nothing but slag; some iron is bound to come with it, and recognizing a leakage at this point, it is suggested that slag and furnace bottoms be run through small crushers with magnetic screen attached. A very small crusher will do the work, coupled with a two-horse motor. In large works operating three or more furnaces, there is thrown away daily one thousand pounds of good iron. This machine could be operated with a labor cost of 75 cents per day, and figuring horsepower at $30.00, that item would cost $60.00 per year. Is the suggestion worth anything?

The scale from annealing pots could also be run through this crusher and reduced to uniformity, making same purchasable as a by-product, instead of being thrown upon the scrap heap.

A CHEMICAL LABORATORY NEEDED.

The need of the chemical laboratory is always present in the malleable iron works, and I herewith suggest a plan by which one may be installed at a cost not to exceed $150.00.

With the successful demonstration of chemistry in the larger plants ever before them, the management of the smaller foundries must do some powerful thinking, and may at times find themselves wavering in the old way of working, and leaning toward chemistry as their guide for mixtures. At such times the one great obstacle has been the supposedly high initial cost of equipping a laboratory with sufficient paraphernalia to carry on such analyses as the casting industry requires. That there has been a misconception of this subject is evident by the absence of chemists in many foundries, which are rated high by contemporaries. If viewed from a conservative standpoint the laboratory pays more on original investment than any department in foundry. Some weight may be attached in this matter, to the remarks frequently heard, that "we have not enough work to maintain a laboratory;" "that we recognize the advantages of same;" and "trust some day to see our way clear, etc." It is with reference to the latter cases that these remarks may appeal, touching upon enough territory to cover either open hearth or gray and malleable casting concerns. There is, generally speaking, in all works irrespective of size, some one person who will for a consideration be found willing to take on more work, and should this person be a melter, or one who calculates the mixtures, so much the better. To such a one the proposition to make the required analyses would be decidedly welcome. A technical schooling is not required, for with a little intelligent "reading up" in the matter, and thoughtful consideration of methods advanced in "Blair's Chemical Analyses of Iron," the problems presented will resolve into interesting experiment, and if placed in the right hands will cause the laboratory influence to be at once felt and appreciated, thus giving mixtures benefit of diagnoses. The management in each separate works has its own ideas concerning best methods of producing its products, be it a cupola, air furnace or open hearth instalment, and without the aid of laboratory the metal sometimes goes astray, the unpleasant experiences following these deviations are decidedly painful. Oftentimes several thousand dollars will not cover the loss, not only of metal, but reputation as well. These tangents from routine are difficult of explanation. Upon investigation its the almost invariable rule to find that every operation was conducted as usual, and employes are at a seeming loss to comprehend fully the importance of these "breaks." That there was something radically wrong is generally admitted, but business continues as before, until another "situation" has to be faced. To any producer who has suffered in this way, chemistry should present itself in the most favorable light, coming to his help with its certainty of result. Mixtures from the present moment must be watched more closely than ever, the steadily rising pig iron market offers but little encouragement to the firms having contracts signed, and which are "short" on raw material, thereby presenting the possibility of taking liberties, with the use of cheaper "initials." When the metal is working poorly (and everyone will be aware of that fact very quickly) the sooner melting comes to a dead stop, and underlying cause of difficulty reached, so much earlier may the sigh of relief come to those most interested. The variation of analyses in one car of pig iron may cause untold anxiety, when once

worked through product, and it is therefore in the anticipation of offering a possible help in this matter that the writer begs to present these few suggestions, trusting that the moment may be opportune. All iron foundries, however small, should in some manner have analyses made of their metal, and if, as suggested above, they can manage to do so with the aid of an employe, who can in three hours per day do this work, they will have made a signal move for the better. The exact chemical composition which is best practice for individual concerns should be determined at once, and when found, may be lived up to closely. It is not necessary to always analyze the pig iron for all four principal metalloids, for in the instance of iron high in silicon it is known that the small amount of sulphur present has little effect upon resultant metal. When iron is low in silicon it is known that manganese is low and sulphur high. In malleable casting the metalloids mostly to be watched are silicon, sulphur and manganese. In gray iron, silicon and phosphorous. In open-hearth steels, combined carbon, sulphur and phosphorus. The laboratory should be provided with the standardized drillings, prepared by the committee of the American Foundrymen's Association, and obtained through members of said committee. The laboratory may be fitted up very cheaply and made thoroughly capable of good work, but at the cost suggested, it will not be a very elaborate affair. A room 10x12 is sufficiently large, with northern light preferred. Along one side, and preferably the longer way of room, should be built a table, fastened to wall, having at one end (and flush with same) a sink with running water. Underneath should be some few drawers, and raised a few inches from floor, a shelf for storage of acid bottles. On opposite side of room will be the "hood" for evaporating determinations, the fumes of which must be carried off. An ordinary kitchen table will make foundation for this. Place table against wall, and box about three exposed sides of same underneath. Construct upon top of table, a glass enclosure, having the front movable. This should rise about three feet, having upon top of same, a wooden funnel, carrying an air duct to roof, having aperture 10x10 inches.

The plate in "hood" upon which the solutions are placed, may be of cast iron, or sheet steel, 3-16 in. diameter, and supported upon corners by wrought iron legs about 8 in. long. The question of gas is an important one; if plant be isolated, the easiest solution of problem would be a gasoline air-pressure apparatus, as will be further suggested. Instead of filter stands, construct racks, having at least six holes in same, the dimensions of which will suggest themselves. This will be about all the carpenter work required, and twenty-five dollars should cover same. The operative apparatus required will be as follows: A weighing balance, either Becker's No. 6 or Troemner's No. 3, to cost $40.00. This should be placed in another room upon desk, away from the injurious fumes of acids. When illuminating gas may be obtained a foot blast is required, cost $5.00. When gasoline is used, a generator is necessary, to cost $30.00. One-half dozen Bunsen burners, and three iron tripods; upon the latter the precipitates will be burnt. Two Bunsen burners are required for hood. For distilling water the apparatus No. 8702 in Eimer & Amend's catalogue, small size to cost $12.50. The amount and variety of glassware and chemicals required will depend, of course, upon how deep into chemistry a firm may wish to delve. For ordinary foundry practice the analyses mostly required are silicon, sulphur, phosphorus and manganese; the following methods for same are suggested and apparatus given below will be amply sufficient for same. Methods are from "Blair's Analyses of Iron." For silicon use Drown's method; sulphur by oxidation and solution; phosphorus, trituration with permanganate; manganese by the color method.

Glassware, Bullock & Crenshaw's catalogue:

½ doz. coarse rolls at	$ 5.20
½ doz. evaporating dishes at	5.48
½ doz. beakers, No. 2, at	1.88
½ doz. beakers, No. 3, at	1.88
1 doz. test tubes, 7x1 in., at	10.05
2 manganese Comfarions tubes.	
½ doz. large watch glasses.	
3 wash bottles, 8 oz., at	14.18
½ doz. Erlenmeyer's flasks, 4 oz., at	6.67

Chemicals:

8 lbs. nitric acid.
8 lbs. hydrochloric acid.
8 lbs. sulphuric acid.

1 lb. hydrofluoric acid.
4 lbs. ammonia.
2 lbs. barium chloride.
2 lbs. sodium carbonate.
4 lbs. molybdic acid.
1 lb. granulated zinc.
2 lbs. peroxide lead.

Added to above will be required a small set of reagent bottles marked for same. It will be readily seen that $150.00 will fully cover cost, leaving some margin for additional supplies.

Note Ed.—The writer of above article will be pleased to suggest further to anyone mentioning their desire, care THE FOUNDRY.

Molders Should Learn to Draw.

BY W. W. HARRIS.

What a lack of training there is of the eye and hand among molders. In the machine shop it is necessary that apprentices learn to draw, such knowledge being a foundation to build upon in years to come, and also creates a thirst for more information along other lines, helping to round out the make up of the man. More and more does the foundry need workers of intelligence and push.

The draughtsmen and patternmakers of to-day make it a study to produce a pattern that shall simplify and save all the machine work possible at the expense of the foundry. The foundry seems to be at the bottom of the heap and is not consulted in such matters at all, but simply kicked into submission. It is not surprising then that men of intelligence are scarce in the foundry. This seems too bad, for it is a business that calls for brains. But to come back to the subject, as there must of necessity be a great deal of mending and building up on molds, a molder who had but an ordinary knowledge and practice at drawing would do such work in half the time and much better than it is usually done, turning out a casting the counterpart of the pattern and not one that would have to be puzzled over in wondering what it was made from. There is a general complaint that there are few molders who can be advanced to foremen. The study and knowledge of drawing would meet such cases, and many a foreman who has to learn such things afterwards would be very thankful if in his younger days he had been grounded in them. The time is very near when the foundries must pay especial attention to the matter of apprentices, for to-day there are not enough good, bad and indifferent molders to man the foundries as they should be. With all the so-called improvement in molding machines, etc., the fact still remains that there is a crying need of more and better molders. The man who is smart enough to make the molding machine a success in every way graduates from it. Bull labor does not pay the best after all. I believe in the molding machine and know there is a place for it in the foundry, but the trouble is that from the ranks of the machine molders of to-day we have to get many of our molders who cannot be classed as brainy molders. The apprentice of to-day should be selected with an eye to the future upbuilding of the business. If the selection be made with the assistance of the firm and the choice not left to Tom, Dick and Harry, much good would result. Pedigree should count right here; something that is not very often called into account. We hope the technical schools will help the foundries in these matters by sending many of their graduates into them. There should be a better feeling between employer and employe; neither can stand alone. Why should not the foundry be able to pick its help the same as other occupations, instead of being obliged to take what is left and try to make something out of nothing?

We live in hope that the day is not far distant when the molder will regain the place he once held in the front rank of mechanics, for it takes a man of brawn and brains to fill the bill.

Feeding, or The Compression of Metals.

BY P. R. RAMP.

With reference to Mr. Roxborough's elaborate article in THE FOUNDRY on the above topic, I must say that I am not in harmony with him in regard to his method of feeding dry sand molds. In an article in the January issue of THE FOUNDRY he says as follows:

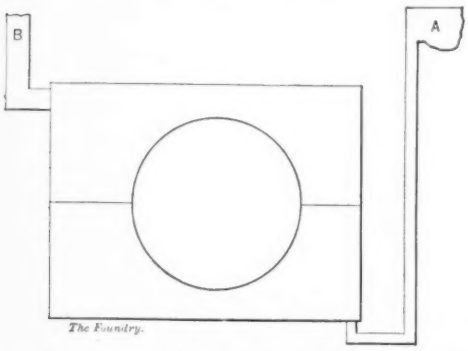
"What should be done is to keep the gates open until all the expansion of the cores is past, and when this point is reached, contraction immediately set to work, which de-

mands the assiduous attention of the molder, etc."

This is necessary in some cases; for instance, in a roll, or any heavy piece with but few cores; but when we have a mold full of cores, as a railroad or Corliss cylinder, the theory will not hold good, because the cores do not reach the limit of expansion till the metal in the mold has become congealed, which makes it impossible to feed as suggested by Mr. Roxborough.

Mr. Moore states, in the March FOUNDRY, that "very often the expansion of the cores in a dry sand mold will cause a crack in a casting" is true, and this proves that the iron solidifies before the cores stop expanding.

This is not mere theory, but the verdict of practical experience. The writer has made many Corliss cylinders weighing from three to six tons each, wherein the method of feeding was as shown in the sketch, which represents the end view of a Corliss cylinder in the position in which it was cast.



A is the pouring basis, B the feeding head.

As soon as a mold of this description is cast, the runner and feeding head are chilled by pouring on cold water, a bucket full of which stands ready for the purpose. This prevents the expansion of the cores from forcing the metal out through the gates or risers, and instead, forces it into the cavities made by shrinkage, thus producing a sound casting.

We have made hundreds of castings in dry sand, using this method of feeding, and our work has always given satisfaction and good service, never showing any signs of defect or blemish.

Believing that experience and results are more substantial than theory, I conclude that the churning rod does more harm than good in a dry sand mold which is full of cores, besides making more work for the molder.

To cheapen foundry product we must simplify the work instead of making it more complicated.

Molding Sand, Facing Sand, Etc.

BY W. R.

The commodity known as molding sand has as wide an application as the art of molding itself, and everywhere that the craft is practiced, sand peculiar to meet the wants of molding purposes must be found. Localities that are highly favored in this respect know not its real value, because nature has supplied them with it in its simplest and best form.

This paper is principally intended to give the basis of molding sand proper, and to leave it with the practical man to compound the constituents for himself, whether it be for coremaking in its varied forms, or for molding also.

This just brings me to the crux of the question, and first of all there never can be uniform adaptation, as every locality must be more or less governed by local conditions, namely, the character of the work done and the material available. In one locality there may be found a sand having too much clay, which means too much plastic matter for binding; while in another is found a sand that is poor in plastic matter but is gritty and porous, and while neither of the two are suitable for molding purposes, probably equal parts of both would make a first-class sand.

Theorists tell us that molding sand is a compound of silica, aluminia, silicate, iron oxides, and other elements, all of which are required to make a good molding sand. While not wishing to undervalue the work of the theorist, yet this seems to me to be as ambiguous as the theoretical explanation of how blow holes are formed in iron castings, and as valueless for all practical purposes.

A sand may have all the elements theoretically mentioned, and still be without the grit and consistency for molding.

Molders as a class have many conservatisms, and in the matter of sand I think they excel themselves, as many are to a great extent guided by color. As a matter

of fact, it matters not what its color may be, or wheresoever found, if it has not the properties as before mentioned, viz., plasticity to bind and porousness to give easy venting, such a sand can in no way be suitable for molders.

The question may be asked, How is molding sand to be determined? The answer is the one common to all practical questions, viz., lengthened experience, practice, and close observation. However, to give an example insofar as light green sand work is concerned, a sand that will pass through a No. 12 or 16 mesh sieve, at a dampness suitable for molding, and carrying with it sufficient cohesion to retain brightness of impression and general contour, is invaluable to molders for architectural work. I should like to avoid invidious distinction, but as the Belfast molding sand fulfils in every way the requirements of what a light molding sand should be, it would be difficult to conceive of any other place being so highly favored in this respect. Everywhere in and for miles around the city (we are told) this sand is to be found. It is of a dark reddish color and has a fine velvety grip and can carry a large amount of water with comparative safety, which, of course, adds to its value for molding. It is largely used throughout the British Isles, and its exportation to foreign countries is considerable. It also gives the most satisfactory results in general light machinery, and brass castings.

As the foregoing principally applies to green sand work of the lighter order, I shall next consider that which is most adaptable to dry sand molding; and while a sand of the Belfast nature may be invaluable for green sand work as described, its want of grit and glutinous matter makes it entirely unsuitable for dry sand work. What is required is a sand largely of a refractory nature to enable the mold to withstand the heat while drying in stove or oven. This sand is known to molders as rock sand, and described by geologists as sand stone. It is said to be entirely free from earthy or vegetable matter, which makes it invaluable whenever exposed to excessive heat. It is to be found in such an advanced stage of decay that milling is not a necessity, although sand for dry sand work is always improved thereby, and that which is rotten and unsuitable for building purposes is generally the best procurable for molding. A core made from this sand may be said to be almost indestructible, on account of its freedom from vegetable matter. I have seen small cores which were fixed in heavy pump flanges five or six inches thick and about eight feet distant from the pouring basin "in the vertical position" so metalized that when taken to the grindstone (for curiosity) gave such a polish that, unless to the practical man, its appearance was more of a metallic core than that of sand, and but for the forethought of the molder causing such cores to get a very special coating of blacking and plumbago wash the fettling of the cores in those flanges would have been an impossibility.

It would not be in keeping with good practice and sense to particularize any recipe for a green sand facing, inasmuch as the circumstances of individual shops are so widely different that what might make a first-class compound in the one, would prove utterly useless in the other. Further, we cannot lay down any hard and fast line for any jobbing shop where the work is so varied in its character. In most jobbing foundries, the black sand for reducing with new sand is generally an unknown quantity. This variation being caused generally through the irregularity of light and heavy work, or to put it more clearly, by using one and the same floor space alternately for green sand and dry sand work. The dry sand job necessitating its being dried on the floor, robs the sand or destroys the carbon which is in all green sand foundry floors.

But if circumstances compel one to use such a black sand as mentioned, a higher percentage of coal dust must be added. The question then arises, Why should we use black sand in mixing a facing sand at all? The answer I give to this is "economy," as no sands for facing compounds can excel those of equal parts of a glutinous rock sand, and an earthy or vegetable sand, such as the Belfast sand, and the requisite amount of coal dust, which can only be determined by intended work and experience. If an ordinary green sand facing recipe for general jobbing castings be desired, I would say take equal parts of the sands aforementioned, and for every three parts of new sand one of coal dust should be added and reduced with black sand, according to circumstances.

Again, with regard to the milling of sand, some consider this to be of extreme value. To my mind it has its limits, as a sand that is milled must at all times be more dense, in consequence of which its venting power is diminished. But in the case of a sand for molding teeth, milling is at all times an advantage, and assuming the teeth to be in the vertical position when casting, as is the case with common spur wheels, the teeth are always stronger both as regards drawing of pattern and mold for casting. Sand for gear wheels is greatly improved by a small percentage of core gum which is not less than three times stronger than flour, and by slightly drying the teeth is not inferior to a dry sand toothed-wheel casting. Teeth made from this sand can stand any amount of drying and may be made as hard as a bone without fear of injuring them in any way, and are also entirely free from swelling, the thing which frequently happens with green sand molded teeth.

Coal dust is an adjunct in the mixing of green sand facing which is most likely at all times to play an important part. If we wish to harden a casting in its mould, such as plowshares, etc., there is nothing I know of better suited to do it with. Care must be taken not to overdo it, as the castings would then become pock-pitted, and this applies to other castings as well.

Wherever heavy metal occurs, and more especially on the bottom of molds of bedplates of any description, the facing of such should always be made with more than the usual amount of coal dust requisite for other parts of the same job, and should this be attended to it will assist considerably in preventing the bottom from scabbing and consequently improve the entire face of the casting. Indeed, to be practically correct, the reduction of coal dust from every course of sand rammed from the bottom upwards of such work as referred to, is what may be appropriately termed intelligent foundry practice.

Further, all parts of a mold that are exposed to the first inrush of the burning metal, such as the losses of wheels that have their pouring gates here, should be rammed with a judicious excess of coal dust in the sand. In attending to those matters as directed above, the molder will have at all times superior results.

In selecting suitable coal to grind into dust it is of the utmost importance to know the proper quality, as a coal of a luminous standard carries too much of a pitchy or tarry substance. These elements are sure to produce bad effects and will show themselves on the surface of the casting in a somewhat honeycombed design, but although of trifling depth are very objectionable. The coal best suited is of the non-bituminous order. This is a coal which is not inflammable by nature, but is very high in carbon, as it is said to contain from ninety to ninety-five per cent of that element.

Casting Aluminum.

Brass founders are always anxious to get sound aluminum castings, and as aluminum has only been taken up by founders within the last few years, foundrymen, as a rule, find it more difficult to get castings of this metal than of brass. All the founder needs is to bear in mind that practice makes perfect. Any skillful molder is bound, in the end, to get good results out of the light metal. The following methods for casting aluminum may be taken as a guide to start the foundrymen in the right direction:

In confining ourselves, however, more particularly to the manufacture of aluminum castings, these castings can be made in any ordinary foundry fitted for making brass castings. The crucible that should be used is a plumbago or black-lead crucible, and the metal is melted preferably over a coke fire. If this is not convenient, however, a fire of charcoal, oil or gas can be used, and are desirable about in the order named. The great object being to use a fuel which is free from nitrogen, phosphorous and salicious gases. It is not advisable to use a fuel of either hard or soft coal, because of the fact that these fuels contain more or less of these gases, which, to a certain extent, will be absorbed by the metal and will cause blowholes. If the fuels are used which are here recommended, it will not be found necessary to cover the metal with any substance to prevent oxidizing.

After the metal is melted it should be removed from the fire and cooled down to the proper temperature for pouring; it, generally speaking, should be very little above the melting point, or when the metal is about a dark cherry red, although the exact temperature at which the best results can be ob-

tained is a matter which can only be determined by experience, for the reason that castings with parts of different thicknesses require the metal to be poured at different temperatures; a thin casting, for instance, should have the metal poured at a little higher temperature in order to get additional fluidity, than would be necessary in pouring a casting composed of thicker parts.

In cooling the metal down to the proper temperature, this should be done by the addition of new metal, after the crucible of molten metal has been removed from the fire, but the metal should not be allowed to grow cold by standing, nor should it be allowed to stand any longer than is absolutely necessary. This cooling is done by stirring with a bar of new metal, or an old gate, or something of that sort, and it will be easy to see by the rapidity with which the metal that is added melts, just how much it is desirable to add. After the metal is once started to pour a casting, it should be poured from the crucible rapidly, but at a uniform rate.

There is apt to be a certain amount of oxide of aluminum in the metal, and if a very fine class of work or a particularly good casting is desired, this oxide to a certain extent can be removed by the addition of nitrate of potash to the molten metal, which is added in quantities of about one tablespoonful to one hundred pounds of aluminum, and in the following manner: After the pot of metal is removed from the fire, place in a sheet of writing paper which has been dipped in water, the nitrate of potash, and place this on top of the metal. Be prepared instantly with an iron ladle, or something which will answer the same purpose, to push this paper to the bottom of the pot. By the time it has reached the bottom, the nitrate of potash will come up to the surface through the body of the metal, combining with the oxide on its way to the surface. The metal should be continually stirred so as to bring as much of it as possible in contact with the potash. It is best not to use too hot a fire for melting aluminum, for the reason that you are not so apt to oxidize the metal if it is melted gradually and slowly.

Castings can be satisfactorily made by the use of an ordinary sand mold, such as would be used for a brass casting, the only additional precaution which it is necessary to take being, that the mold should be thoroughly well ventilated, and also that it should have a large gate and high riser. These points cannot be too strenuously insisted upon. The object, of course, is to allow as much of the gas to escape as possible, and it is more necessary in casting aluminum than any other metal to have a large gate and high riser, for the reason that the object to be gained is to have the metal in the body of the casting cooled before the metal in the riser, thereby allowing the metal in the riser to flow in and supply the shrinkage as the aluminum in the body of the casting shrinks, and it is very much more necessary to have large risers in the use of sand molds than it is in the use of hot iron molds, where only small gates are necessary.

As in other castings, of course, the finer the sand that is used in making the mold, the more perfect the surface of the casting, and if it is desired to get an aluminum casting with a very fine surface, the best results can be obtained by first facing the mold with a fine Connecticut sand, which has first been thoroughly dried, and then, after the mold has been faced with it, it should be baked with the smoke from a gasoline torch. If these precautions are followed, the ordinary brass founder will have no difficulty in making successful aluminum castings with but very little trouble and experimenting.—Aluminum World.

Making of Projectiles.

With Practical Hints on the Construction of Patterns, Core Boxes, Flasks, Etc.

BY JAS A. MURPHY.

During the recent war with Spain projectiles of different sizes were wanted in large quantities by the government, and many of our foundries were benefited to a considerable extent by getting large orders for the very potent life extinguishers known as shells. Many others could have gotten orders, but the exact specifications put a quietus on their ardor for doing government work. Some shops made a few on trial, and that few sickened them of the job. Shells of all sizes must be perfect in every detail, according to plans and specifications furnished, and must bear a tensile strain of at least 27,000 lbs., a result that, strange to

say, many foundrymen think cannot be gotten from the cupola. The job is a perfectly plain one so far as the molding is concerned, but it requires a foreman of thought and intelligence to get up a proper "rig," and it may be wise to remark that it is time and money lost to try and get good castings from any kind of a makeshift apparatus.

By carefully studying the illustrations herewith, anyone who is fortunate enough to be able to get an order for small shells can with ease get up a thoroughly reliable "rig."

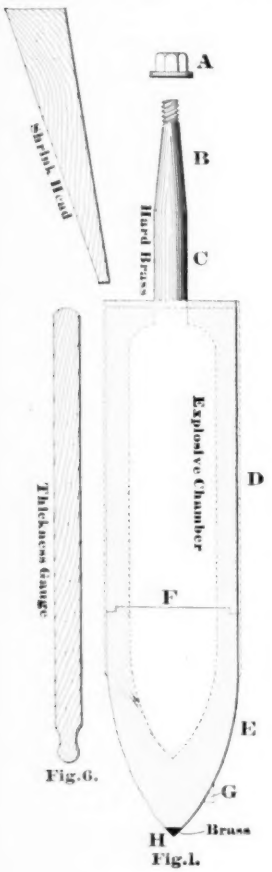


Fig.1.

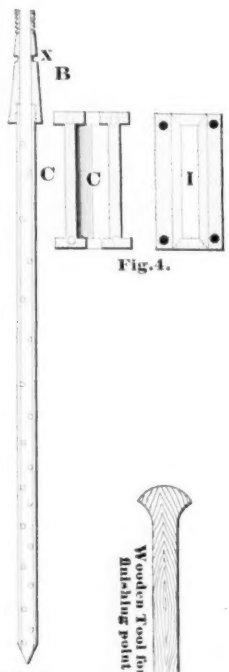


Fig.4.

Fig.2.

Fig.8.

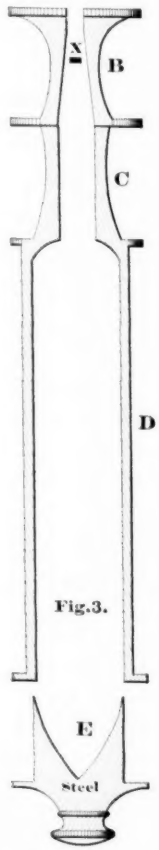


Fig.3.

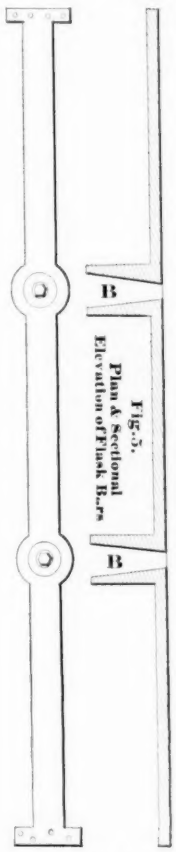


Fig. 1, which is a combination drawing, shows the shell and pattern in section, and the way such pattern should be made. In the making of this pattern I am adopting a plan of my own; one that I consider an improvement on any other method. The cylindrical part D should be first turned up a little larger than the required diameter to allow for turning, as shown by dotted line, and then the part E made to fit to it in socket form as shown at F. If a considerable number are to be made the socket is best lined with brass and the extreme point H will best retain its shape if a good heavy cone-headed piece of brass is screwed or driven into it and then filed down to a perfect point, according to plan. The shank B C may be said to be the most important part of the pattern and is best made of gun metal, or some other hard composition that will not easily wear from constant use. The best way to have it made is to have it cast vertically with a round plate at the point of juncture with the wood pattern. This plate answers three good purposes: It is easier to secure the shank to the pattern, the plate will prevent the pattern from losing its proper shape on the corners by being struck with the rammer, and its thickness

will act as a sullage head, as it is important that at least one-half inch of head be allowed to receive dirt. Such a shank can in a few minutes be screwed to the pattern and is safer and more rigid than if the piece were made straight and driven down through the pattern. It should be turned perfectly smooth and true; as can be seen by the illustrations, it must fit true in the cope bars, in which the core is afterwards secured. The principal point to remember is that the part B B B B of the pattern, core rod, core box and flask bar are all turned and bored true to template. It is easy to see the necessity for this. Should part B of the core be a little too large it will not go down far enough in part B of the bar, and as a consequence the core is longer than it ought to be, the casting is lighter, the chamber is deeper, and a rejected casting is the result. The very opposite, having the shell too heavy and the chamber too shallow will be the case if the part is too small and goes down too far in the bar. Absolute exactness should be the rule in the turning and boring of these very particular parts. The triangular little piece G, on part E of the pattern, is cast on for the purpose of allowing the casting to be caught in the lathe chuck, and when the casting is finished it is chipped off even with the surface. Such a piece is cast on all projectiles, shot and shell, large and small, for the same purpose.

With the pattern completed, the core boxes, Figs. 3 and 4, next take our attention. Fig. 4 is a plain cylindrical core box, long enough to form the round portion of the core at C, and has its ends made so that the rod will project through them, while the chamber is the part to form the core. When the rod is placed in the bottom half, C, the sand is tucked around it, the top half is put on and the sand rammed through the rectangular slot I. After top half is taken off, the projecting sand is trimmed off to conform to proper proportions, the rod with its part of core left to dry or harden. While it is drying we will devote some attention to the more important core box, Fig. 3. This should be made of cast iron or brass, the top piece E, which forms the point, of good steel.

It is best to make this box in two halves, with three pieces in each half, which, after being properly fitted, are assembled at the flanges. When the rod with its part of round core is fit to handle it is set in lower half of core box, Fig. 3, the top half closed over it, and both halves securely clamped together, after which the box is turned up in a vertical position and the body of the core rammed up even with the top, when the part E is driven down with the aid of a mallet, which finishes the core. When taken out of the box it is placed on the bench in a vertical position in a plate having holes to receive the shank, or it may be put directly in the oven in a similar plate, as occasion requires. After being dried it is dipped in a pail or barrel of previously prepared blacking, and given another coat while in the oven, great care being taken not to allow it at any time to burn. The core rod, Fig. 2, is also a very important factor, as previously explained. The shank B should be a drop forging and turned up true to template, with an external thread on top for nut and an internal thread on bottom to receive the wrought iron tube C, which should be perforated as shown in illustration, to allow the gas to escape through from the core. The slot X in part B answers a good purpose, inasmuch as it is to fit into a corresponding projection X in core box, Fig. 3, and makes sure that all cores are the same unvarying length. A thickness of one-eighth of an inch of hemp should be wound around the rod before making the core on it. Fig. 5 is a plan and sectional elevation of flask bars and they should be made of cast iron.

As the shells which are the subject of this article are only 3 in. in diameter, four of them can be comfortably made in an 18 in. flask having two bars. The cope should be just the depth of the cylindrical part of pattern D from its junction with the part E to within one inch of the top of shank B C. This will allow the head to protrude and give a chance to put on the nut A so as to hold the pattern firm. The four patterns are secured in the bars and rammed up in green sand on a plain board, gate pins set in their proper places and the shrink head, which is made to conform to the shape of pattern as shown, is rammed up in its place also; the cope is rolled over on two skids, and after the joint is made, part E of the patterns is set on, gate set in, the nowel is rammed up, the whole rolled back, cope

lifted off, and mold finished in the usual way.

The setting of the cores demands skill and care, as an even thickness must be on shell all around, no variation being allowed. Much is to be learned about the job that cannot be very well explained within the limits of a short article like this. But by carefully studying the accompanying illustrations a very fair idea can be obtained.

Large Pots for Chemical Works.

The engraving shows two pots, one within the other, both together weighing 8 tons. They were made in the foundry of the Dobbie Foundry and Machine Company, Niagara Falls, New York.

The outside pot is 6 feet 10 inches diameter by 5 feet 6 inches deep by 1¼ inches thick; weight, 4 tons.

It was cast in a pit, in green sand, bottom down, just as it stands on the wagon. The outside of the mold was swept up and staves 1¼ inches thick were set against the wall for thickness. The flask was of iron, and the core was anchored to the cope and lifted with it. The two castings were made without loss, and both were perfect. The branch gates were four in number, set two feet apart, and entering at the bottom of mold, where they measured 3 inches by ¾ inch. The average cost in wages for molding alone was about 37 cents per cwt.

Notes.

BY GEORGE M. RICHES.

Flasks.—In looking over back numbers of THE FOUNDRY, I found an article on specially constructed molding flasks which can be made up to different sizes, presumably by unbolting and rebolting. Now it has occurred to me that foundry practice in the states differs from that in England in the matter of flasks more than anything else. Although it is a harder matter to get foundry proprietors to adopt special machinery in England than in the states yet in English foundries very few wooden flasks can be found. We look upon them as being very frail, short-lived and consequently expensive things. Cast iron flasks are invariably used of sizes to suit the work, and when it is advisable to make them in parts they are made with iron also. I have seen some as much as 15x10 feet cast whole and very good, too, when properly proportioned. And following the absence of wooden flasks comes the absence, to a great extent, of clamps also, either common or special, as the iron

flasks for the floor are provided with cottars and pins, which are handy and secure, while the boxes for bench work are generally weighted; and here allow me to mention that I have patented a very simple flask and fastener, which is selling well, considering the time it has been on the market. Snap flasks are seldom used.

Matches.—In another article I find allusion to the serviceableness of matches (or odd sides as we call them), sand and plaster; while it must be admitted that plaster is lighter than sand, yet I certainly prefer sand; plaster, as said, is not nice to use, and it is not fit for constant use, nor is it easy to get the patterns to fit slack as required. In making sand matches I proceed very simply: Take the required amount of damp floor sand (nearly damp enough for molding) and mix linseed oil with this until it is quite as damp as core sand; ram up and loosen patterns so they will drop in easy when it is dry; give a coat of oil while hot, after drying in a hot oven. To make an extra good job give a coat of red-lead paint and then shellac varnish; for lightness I sometimes use an angle iron frame backed with a plate just deep enough for patterns or an ordinary flask with plate just deep enough; they can thus be made light and yet serviceable.

Sands.—At different times I find analysis of sands and what their composition should be. May I suggest that the American Foundrymen's association take this question up closely and give through these columns the complete analysis of facings ready for use, for say light, medium and heavy work; also the best, simple method of analysis, either mechanical or chemical. The method of pouring off the clay from the silica seems to me very uncertain, as I often get results varying considerably. Can the following method be improved? Will some of our readers who know please take it up, as I consider the question of sands very important:

To Sand to be tested, placed in beaker, add H_2O and HCl.
Heat and Filter.

Residue: Sand and Clay; Stir briskly with water and immediately pour off clay with water, collect and weigh; note the percentage.

Filtrate: Add NH_4OH and Filter.

Insoluble: Al_2O_3 or Fe_2O_3
If Al—Yellow ppt.
If Fe—Red ppt.

Filtrate: Add $(NH_4)_2OX$

ppt—Calcium Salts.

Filtrate: Add Na_2HPO_4
A ppt.—Magnesia Salts.

Chills.—Allow me to remind those who have not tried chills or cast iron cores where they are applicable of the several advantages they offer in various cases, as I have adopted them in many instances with good results; obviously where holes have to be bored, non-chilling irons must be used.

In a case of base plates with heavy central cored boss, which used to break when being keyed on the spindle, I adopted cast iron cores in place of sand cores; the effect was to cool the boss quicker, make the metal closer and the castings stronger, being less subject to internal strain. Again, square and round holes for bolts, etc., can be better relied on for fit when cast iron cores are used instead of sand cores. Double steam cylinders with no opening between the boxes having a lump of metal in the center, which cools last when cores are used, always show more or less spongy, may be improved by making core, which comes to this part of iron so as to cool the center earlier. In the above I have said "cast iron," where mention is made of chill, for the reason that it is considerably cheaper and the metal seems to lie better to cast iron than to either forged iron or steel, and they keep in better shape. They are coated with a liquid compo. and parting sand. Nothing has yet been said respecting cost, but there is a considerable margin in favor of chills—no cores to make and dry, less work in trimming, no sand in the holes, less core sand used. Much more might be said but enough to show that they need only be tried to be appreciated.

Cleaning brass castings.—I should like some of our readers to tell us of the best method of cleaning brass castings by machinery.

Brass Founding—Answer to Robert Wagner, Chemnitz, Germany.

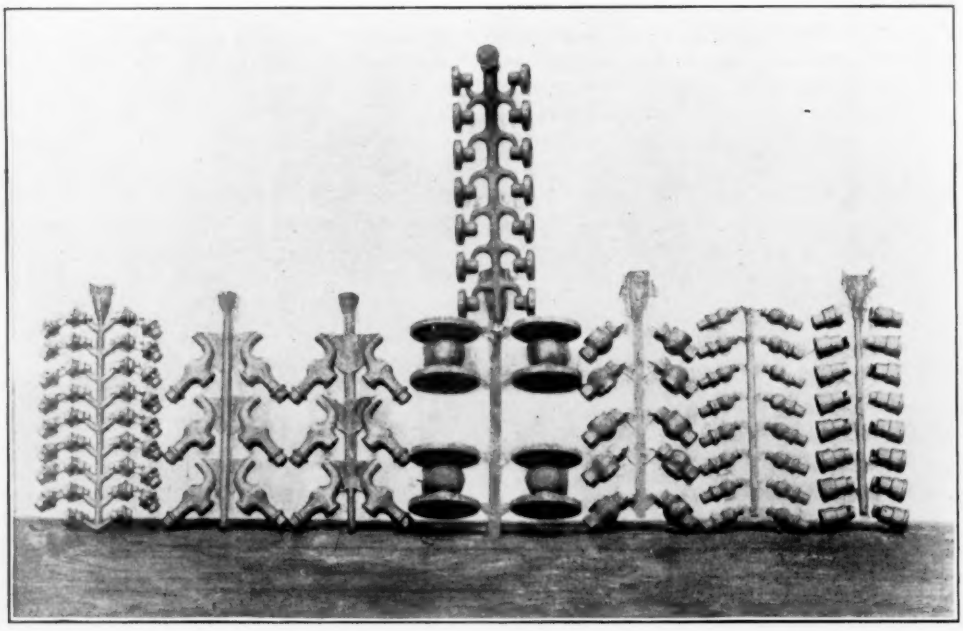
This correspondent writes that he has trouble with steam metal valves, whenever he attempts to cast the same in green sands. He encloses a photograph of the valves in question, and also of other brass castings, illustrating the method of gating and pour-

ing. The trouble is caused by holes appearing in the upper part of the castings; these holes are about one-half in. in size, and the castings do not have the appearance of being porous. From the fact that whenever the castings are poured in dry sand they are sound, we may infer that the mixture of metal is not in fault.

The cause of the trouble therefore lies either in the sand, or in the method of molding, or pouring.

If the sand was too close the same trouble would be experienced with the other castings illustrated; as these appear perfect we may acquit the sand of blame also.

me that these valves are gated too lightly. On either end (of the valves) there is a comparatively large and heavy circular flange. There are four castings in a mold, two at the upper and two at the lower end. The gate appears slender, wholly in one-half of the flask, and is connected to both flanges of the patterns. The core prints occupy the apparently large space which separates the upper from the lower pair of castings. As I before mentioned, these castings appear to have been poured vertically, and in order to properly run them it appears that the metal must have been poured hot. When bronze is poured hot into heavy green sand molds,



This narrows us down to the method of molding or pouring. In the photograph we have eight gates of brass castings, just as they come out of the sand.

Of these eight gates, two are "libs," two valves, (one small and one large) one of cocks and the other three may be either nuts, or unions. Seven of these gates appear to have been poured vertically. In this country, the libs or faucets are the only castings that would be likely to be poured in this manner. The other castings come better when poured horizontally, the sprue end of flask being elevated two inches. All these castings with the exception of the large valves are gated correctly, and it appears to

there is sure to be more or less trouble from porosity. I therefore recommend a careful study of the paper by Max H. Wickhorst, on "Porous Castings and Occluded Gases," which appeared in the February FOUNDRY of this year.

Moisture is the cause of the present trouble, as is proved by the fact that when the molds are dried the castings come sound. The writer would recommend that these valves be poured horizontally, the molds being level, and not inclined any way. The sprue or pouring gates should be one and a half inches in diameter, and placed in the center of the mold between the four castings; it may be inclined so as to bring its mouth

near the side of the mold for convenience in pouring. The gates should be enlarged to twice its diameter by cutting a channel in the cope; enlarge it also where it joins the casting, making it round or oval. Pour the metal at a low temperature, and pour rapidly. Have the cope or upper part of mold three inches higher than the top of the flanges, and, be careful when ramming the sand over the same, not to get it too hard, as this is a fruitful cause of just this trouble.

Should there also be trouble with the smaller valves, try pouring them horizontally, inclined two inches; use a one and one-fourth sprue, pour cool and rapidly.

Second—I know of no practical method of extracting iron in alloy with brass. Such metal should be run into ingots and proportioned amongst the clean metal, or, run into castings where its presence will be immaterial.

If the scrap brass contains particles of iron mechanically mixed, these may be removed before melting by means of magnet.

C. VICKERS.

Chicago, Ill.

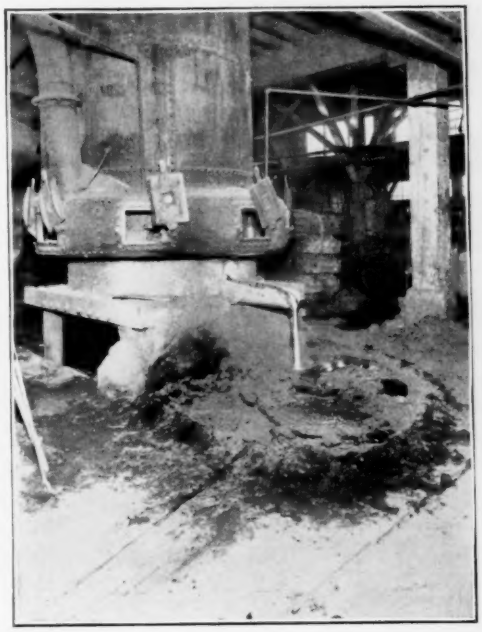
CAST IRON NOTES.

Devoted to Inquiries from Practical Foundrymen on the subject of Melting and using Cast Iron. Address all Inquiries to W. J. KEEP, care of The Foundry

RECOVERY OF IRON FROM CUPOLA CINDER.

I have just received a leter asking for information on this subject. A year ago I gave experience with various cinder mills. Since that time I have devised another plan.

After the last iron has run out of the tap hole after a heat the cupola breast is knocked in with a heavy bar which allows all slag to run out on the floor. A dam of sand keeps it from running too far. If any iron comes out with the slag it runs into a slab under this slag and is removed in the morning. When the slag stops running the bottom is dropped. The bottom is composed of unburned coke, unmelted pigs and small pieces of iron, but nothing is cemented together because the slag has been removed In the morning the pieces of sand bottom are picked out and the rest is quickly shoveled up and taken to the cupola platform and placed where it will not be in the way of charging iron. The skulls from ladles which contain considerable iron, the sweepings from gang ways, all iron borings, and any other rubbish containing iron are thrown on the same pile. After the last charge of iron is in the cupola the melter for a little time has nothing to do but clean up. During this time with a fork he throws aside the coarser coke. It makes no difference if iron or bits of slag go with it for all will go into the cupola again. All unmelted pigs are thrown to one side. All that remains is shoveled into the cupola unless there seems to be considerable dirt which may be riddled out. If there are borings to be melted they should be shoveled in before the cinder is charged The cinder being wet acts



like the covering to a blacksmith's fire and the iron at the tap hole shows increased heat on account of the blast being less free to escape. The iron and slag are all melted by the intense heat and a layer of fine hot coke is left on the surface. The iron is drawn off and run into the pig bed and the slag runs out when the breast is knocked in.

The unmelted pigs that dropped with the bottom must be melted next day with coke that dropped at the same time and any remaining coke can be used by the melter as he chooses. The iron and coke that comes from the bottom has already been weighed and should not be weighed again.

The sorting of this cupola cinder after the last charge costs nothing, while some one would have to be paid for sorting it in the morning for a cinder mill. The first cost and repairs of a cinder mill and power to run it and cost of attendant and of wheeling to and from the mill are saved. The fine coke and iron formerly carted away as mill cinder are saved and the covering in the cupola makes the last iron better and prevents the fine iron blowing out of the cupola.

Personal.

Frank B. Baird, of the Union Iron Works, has been elected a director of the Pan-American Exposition of Buffalo, N. Y.

Mr. Nicholas Muse, Sr., of New Castle, Pa., has been appointed superintendent of foundry at the Carnegie plant at Braddock, Pa.

Mark W. Comstock has been appointed secretary of the American Car and Foundry Company, with headquarters at St. Louis, Mo.

Mr. Stewart Johnson, who has for some years been general superintendent of the American Steel Casting Company, has accepted the position of superintendent of the Pittsburg (Pa.) Steel Foundry Company.

The Chattanooga (Tenn.) Times, of April 16, says: "J. W. Warnock, late foreman of the South Pittsburg Pipe Works foundry, has disappeared from here, and it is claimed that he owes debts aggregating over $500.

A. C. Hawes, manager of the Chicago office of Matthew Addy & Co., has returned from New Mexico, where he has been for the last six months in a successful search for health, being very much benefited by the change.

G. W. Knotts, mechanical engineer of the rolling mills department of the National Tube Works Company, McKeesport, Pa., resigned his position on May 1 to accept a position with the Lincoln Foundry Company, Pittsburg, Pa.

Mr. Hamilton Barclay has resigned the foremanship of foundry at the Ottumwa Iron Works, Ottumwa, Iowa, and has removed to Minneapolis, Minn., where he takes the foremanship of the Twin City Iron Works foundry.

John Evans, assistant superintendent of the Brier Hill Iron & Coal Company, Youngstown, Ohio, had been appointed superintendent of the West Duluth Blast Furnace, recently acquired by John M. Thomas and others.

Patrick Coleman has brought action of tort to recover $5,000 damages from the Mechanic's Iron Foundry Company, at Mansfisld, Mass., because iron flew from an alleged defective mold and put out an eye. The accident occurred in 1896.

Charles Boston, 23 years old, was arrested in Newark, Md., on April 18th, charged with the embezzlement of $1,000 from the Tioga Foundry Company, Philadelphia, Pa., where he was employed as paymaster. Detectives say he confesses to having stolen $1,000.

James F. Powers, who was owner and proprietor of the Elkton, N. D., Foundry until the past year, when he went to Garwood, N. J., to take charge of a large foundry belonging to a stock company, will return to Elkton in the near future, and start up the Elkton Foundry again.

Mr. David Spence, for the last ten years superintendent of foundry for the Demorest Manufacturing Company, at Williamsport, Pa., has been appointed superintendent of the Foos Manufacturing Company's new foundry at Springfield, Ohio. This is one of the finest foundries in the State.

John R. Cullingworth has resigned his position as foreman of Wetherill's foundry in Chester, Pa., a position which he has ably filled for over twenty years, and John Strain will take the vacated position. Mr. Strain is from Buffalo, New York, and enjoys a good reputation as a capable molder.

Solomon Matthews, 74 years old, was found by his son, on the morning of April 14, hanging by the neck from a beam in the loft of his iron foundry, at Milford, Delaware, twenty miles from Dover. No cause is assigned for the act. He was highly respected, and had the confidence of his entire community.

President Schwab, of the Carnegie Steel Co., Ltd., has secured, by the assistance of Congressman Dalzell, one of the guns of the Spanish battleship Viscaya, for the city of Pittsburg. It will be placed in Schenley Park (visitors who attend the American Foundrymen's Association convention, May 16-19, may be able to see this relic).

Charles H. Hill, of New Haven, Conn., has taken the position of foreman of Brad-

ley & Hubbard's brass foundry at that place, succeeding Mr. John H. Bastian, who is building a new block at New Britain and wishes to supervise the work. Mr. Bastian's property interests have become so large that he has decided to retire permanently from factory work.

Mr. George B. Smith, for a period of forty-eight years foreman of the Lowell Machine Shops Foundry, retired from that position on April 1. On Saturday night, April 8, his former shopmates, employers and employes, gathered at the old gentleman's residence and presented him with an elegant couch and a Morris chair, and in other ways testified the high esteem in which he was held. Mr. Smith was of the "old school" of foremen, who knew how to conduct a foundry so as to make money, and at the same time win the hearts of his associates in the business.

Deaths.

Absalom B. Harris, a prominent molder of Quincy, Ill., died on April 9th, at his home in that city.

Mr. Daniel T. Kelley, head of the firm of Daniel T. Kelley & Sons, Portland, Me., died May 5, aged 54 years.

Mr. John Dixon Tuell, who for many years conducted a brass foundry in Warren, R. I., died in that city, April 30, aged 91 years.

Mr. James Gurney, of East Boston, head of the firm of James Gurney & Co., iron founders, is dead at the age of 81 years.

Joseph McClure, who erected and operated the first blast furnace near Sharpsville, Pa., died March 29, near Sharon, Pa., aged 89 years.

James Woods, head of the iron manufacturing firm of Woods, Lewis & Co., Nashville, Tenn., died suddenly at his home in that city on April 12, aged 64 years.

Adolph Kaesberg, lately retired from the management of the New Athens (Ill.) Foundry, of which he had been part owner, died the last week in April ult., at Belleville, Ill., aged 49 years.

Thomas Hood, who died at his home in Philadelphia, April 31, aged 85 years, started the business known as the Fairmount Mahcnine Works, in Philadelphia, and continued it for nearly 50 years, retiring in 1888.

George Peacock, founder of the Peacock Iron Works, Selma, Ala., died at his home in that city March 26, aged 76 years. He was the inventor of the Peacock self-oiling wheel, much used on tram cars.

Mr. Hugh F. Davitt, who has, for the last five years, conducted the Trask Iron Foundry at Springfield, Mass., died May 2 at his father's home in that city, after ten days' illness, of pleuro-pneumonia, succeeded by heart failure.

Felix Brown, senior member of the firm of A. & F. Brown Company, Elizabeth, N. J., died April 6 of paralysis, at his home in Elizabeth. Mr. Brown is said to have invented the foghorn used by mariners, and other machines and devices.

Joseph B. Vanbergen, head of the Vanbergen Company, Ltd., Carbondale, Pa., foundrymen and machinists, died April 24 at his home in Carbondale, aged 72 years. He had filled many offices of trust, including that of Mayor of Carbondale.

Lucius M. Pitkin, president of the Variety Iron Works Company, Cleveland, Ohio, and one of the best known business men of that city, was struck and instantly killed by a Lake Shore train on April 29, at Coits, a suburb of Cleveland. He was 70 years of age.

Benjamin Eastwood, president of the Eastwood Machine Works, Paterson, New Jersey, died suddenly at his home in Paterson, April 26, aged 60 years. He founded the large concern of which he was the head, was president of the Paterson Board of Trade, and very prominent in educational and charitable work.

Geo. W. Seyler, owner of the Hancock (Md.) Foundry & Machine Works, died April 25, at his home in that city, of a complication of ills, aged 51 years. He had been sick for some time and his death was not unexpected. Mr. Seyler was one of the most prominent men of the city, and was held in universal high esteem.

Charles Sheppard Roe, president of the Railway Supply Foundry Company, of Chicago, died in his room at a private lodging house in New York, while on business in that city, on April 20. He had suffered from heart trouble, but when he left his home, at his brother's house in Chicago, he was feeling quite well. Mr. Roe was un-

married and lived with his married brother, E. A. Roe, on Ashland Boulevard, Chicago.

Frank B. Davis, president of the Davis-Ludwig Foundry Company, Chicago, Ill., died suddenly early on the morning of April 18, of heart trouble, at his home, 330 E. Fortieth street, aged 59 years. He was mustered out of service in the civil war, as first lieutenant, and tried to raise a regiment for the late war with Spain, but failing health compelled him to give it up. He was prominently known in Illinois militia circles.

Captain Alfred E. Hunt, of world-wide fame as a chemist and metallurgist, captain of Hampton Battery B, of the National Guard of Pennsylvania, died suddenly at the Hotel Lafayette, Philadelphia, on Wednesday, April 26, from hemorrhage of the bowels.

Captain Hunt was the founder and senior member of the Pittsburg Testing Laboratory, and was president and organizer of the Pittsburg Reduction Company, which has been a chief factor in developing the production of aluminum. In service in Porto Rico, during the Spanish war, he contracted the disease which resulted in his death, at the age of 44 years.

Fires and Accidents.

The foundry of Messrs. Bowie & Blanks, So. Boston, Va., was burned April 22.

Fire destroyed Garth & Company's foundry, at Montreal, April 6. Loss, $10,000.

The American Bed Foundry, at Northville, Mich., was destroyed by fire April 30, caused by lightning.

The Page Foundry, at Frederick, Md., was damaged several hundred dollars by fire April 6. Insured.

Fire damaged the plant of the Malleable Iron & Machine Works, at West Duluth, April 11, to the extent of $3,000.

The Marshall Car & Wheel Foundry, at Marshall, Texas, was destroyed by fire, April 16. Loss $10,000; insurance, $6,130.

The foundry of Morris & Lewis, Rock Island, Ill., was slightly damaged by fire, April 6. The fire caught in the cupola scaffold floor.

Fire at Jonesboro, Ind., April 13, destroyed the brass foundry, owned and operated by Mr. Jack Rook. Loss, $3,500; insurance, $1,800.

Moses Tait, manager of the McCullough & Tait foundry, at Calais, Me., sustained a broken bone in the leg, April 5, from the glancing blow of an ax that he was using.

Thomas Marshall's foundry at Pittsburg, Pa., was damaged by fire to the extent of $5,000, April 18. The woodwork around the cupola ignited first; covered by insurance.

At a large fire in Oshkosh, Wis., April 12, among other buildings, the Star Foundry & Machine Works, owned by J. A. Barnes, was burned. Loss, $20,000; insurance, $8,000 to $10,000.

Wm Tallman, of North Dighton, Mass., foreman of the Co-Operative Stove Foundry, was thrown from his bicycle and severely injured; his shoulder was dislocated and his collar bone broken.

Thos. Kirby, of Milford, Mass., was badly injured while at work in the Hopedale Foundry. His arm got caught in a machine, fracturing his wrist, breaking two knuckles and lacerating the flesh badly.

The Twin City Iron Works, at Ironwood, Mich., owned by E. Charbonneau, were completely destroyed by fire on April 12. The loss is $40,000. The owner has a foundry at Hurley, Wis., which will probably be equipped at once and started up.

Irving Johnson died in a house ambulance on the way to the city hospital at Boston, Mass., on April 11, and John C. Cotton is lying at that institution suffering from severe contusions and burns, caused by a crucible of metal accidentally upsetting in a tank of water, resulting in a powerful explosion. Cotton will recover.

The plant of the Globe Steam Heater Company, at North Wales, Pa., was destroyed by fire April 20. The loss is estimated at $20,000, against which there is an insurance of $6,500. The burned buildings included a foundry, boiler house and warerooms. The works were owned by a stock company, of which H. H. Kriebel is president.

Daniel J. Slattery, was manipulating a "lift," transferring a large casting by means thereof, in the foundry of the Walker & Pratt Company, at Watertown, Mass., when the chain broke, and the heavy casting fell, striking Slattery in such a manner that his arm was broken, several ribs were injured and he was otherwise hurt. It is thought he will recover.

The explosion of a mold at the Brown Cotton Gin Works, at New London, Ct., on April 14th, resulted in the more or less serious burning of seven men. Nicholas McBride was burned in the face and arms; Thomas Allen, face and arms; Timothy Murphy, face and arms; John Prendergast, foot and arm; Tony Groton, body; Frank Corcoran, hip; Patrick Sullivan, arms. The most seriously burned were Messrs. McBride, Allen, Murphy and Groton, the latter's clothes being nearly burned from his body. All will probably recover.

Henry Lizot, one of the molders in the foundry at the Fairbanks scale works, St. Johnsbury, Vt., was dreadfully burned Monday afternoon. While carrying a ladle of melted iron, he slipped, falling on his back and spilling the hot iron over his chest and limbs. His mates tore his clothing from him as quickly as possible, but on account of their inability to remove the leather belt about his waist his body was more severely burned than his limbs. He was carefully wrapped in blankets and taken to his home, where a doctor dressed the burns, which, it is thought, will not prove serious. It was the worst accident of the kind that has ever happened in the foundry.

New Buildings and Enlargements.

Clinton Burnham is erecting a new foundry at Milwaukee at a cost of $6,000.

The Buckeye Engine Co., Salem, Ohio, will erect a new foundry at a cost of $40,000.

The Queen City Foundry Company will erect an $11,000 foundry at Cincinnati, O.

The new Conneaut Foundry, at Conneaut, Ohio, is about ready to start in operation.

A foundry, 55x165 feet, will be erected by the Valley Iron Company, Williamsport, Pa.

F. E. Thomas will build a foundry and machine shop at Cherryvale, Kan., 75x250 feet.

The W. E. Caldwell Co. has been issued a permit to erect an $8,000 foundry at Louisville, Ky.

The Southern Car and Foundry Company, Trenton, N. J., has been incorporated; capital stock, $750,000.

The Superior Drill Company, Springfield, Ohio, will build a new foundry at once.

The Webber & Philbrick Company will erect a building for pattern storage at their plant in Lewiston, Me.

The Wheeler & Wilson Co., Bridgeport, Conn., will immediately build a large new foundry, of brick and iron.

Stock is being subscribed for the erection of a new stove foundry at Quincy, Ill., the capital to be $30,000.

The Moore & White Company, Philadelphia, will build a two-story extension to their foundry, 112x25 feet.

The Morgan Engineering Company, of Alliance, Ohio, will soon begin the erection of a new foundry, 100x200 feet.

Another large addition will be made to the iron foundry establishment of Stanley G. Flagg & Co., of Pottstown, Pa.

W. H. Crowe and others will erect a $20,000 foundry and machine shop at Jellico, Tenn., to employ about 50 operatives.

Articles of incorporation of the Acme Fence and Foundry Company, at Indianapolis, Ind., have been filed. Capital, $6,000.

President O. S. Kelly, of the O. S. Kelly Company, Springfield, Ohio, states that plans are being made for a new foundry, 40x250 feet.

The Emerson Company, of Rockford, Ill., will at once begin the erection of their new foundry, which will be 80 feet by 200 feet, one story.

The Huber Manufacturing Company, of Marion, Ohio, have built a brass foundry, and will hereafter manufacture their own brass castings.

E. Adams & Son, iron and brass founders, Binghamton, N. Y., contemplate the erection of a large additional foundry, for the manufacture of hot water heaters.

F. E. Meyers & Bro. have let the contract for enlarging their foundry at Ashland, O., which will make the total structure 125x210 feet, doubling its present capacity.

A Pittsburg firm has been awarded the contract for the new foundry building for the Shenango Machine Works, at Sharon, Pa. About 150 men will be employed.

It is reported that Jas. Crook and W. M. Cowel, of Kenosha, and J. J. Wood, of Racine, Wis., have formed a company for the manufacture of malleable iron, at Fairview, Ill.

A charter has been granted to the Lincoln Foundry Co., of Pittsburg, Pa. Wm. L. Abbott is one of the incorporators. The capital

stock is placed at the nominal figure of $1,000.

The Ross-Meehan Foundry Company, of Chattanooga, Tenn., has finished the installation of a new set of annealing ovens at its malleable iron plant. This will double their capacity.

The W. H. Goodman Company, of North Dana, Mass., have erected a foundry, and will hereafter make their own castings, instead of buying them from outside parties as heretofore.

N. C. Webb & Son are preparing to erect a large two-story brick building for a machinery and power house at their foundry plant in Fulton, Ky. The new structure will be 35x100 feet.

The Leffel Water Wheel Company will remodel its foundry plant at Lagonda, Ohio. A new roof will be placed on the building, and equipment will be installed for the handling of heavy castings.

Work is progressing rapidly on the new foundry of the Great Western Manufacturing Company, at Leavenworth, Kansas. It will be 125 feet long. They will cast pulleys up to 12 feet diameter.

The Bliss Heater Manufacturing Company, which has been doing business in Avon, will locate in Bushnell, Ill. The main building of the new plant will be 54x70 feet; the foundry, 40x50 feet.

The Standard Pulley and Foundry Company has filed articles of incorporation at St. Louis, with a capital of $20,000. The stockholders are: Chas. C. Hunleth, Frank J. Hunleth and Gustav J. Hunleth.

The Muncie Foundry & Machine Company, of Muncie, Ind., were incorporated March 30, with a capital stock of $25,000, by Arthur F. Patterson, George F. McCulloch, Will M. Patterson, William C. Denny and William C. Sampson.

It is reported that the firm of Barnard & Leos, of Davenport, Ia., will cease to exist, and that the company's Moline foundry will be owned and operated by Mr. Barnard, he having agreed to pay $125,000 for his partners' interest.

The blacksmithing firm of Wilson & Matson, Mt. Pleasant, Utah, contemplates building a foundry and to go extensively into the manufacture of the Wilson plow attachment, which converts a walking plow into a sulky plow at little cost.

The property of the Graff Stove Company, of Sharon, Pa., was offered at public sale the second time last week. The price offered was $4,400, by the Aschman Steel Casting Company, of Sharon, Pa. The bid was rejected and the sale adjourned until Thursday, April 27.

Application was made May 1, for the incorporation of the Pittsburg (Pa.) Brake Shoe Co., by Frank Moore, Philo N. French, superintendent of the A. French Spring Co., John M. Patterson and George A. Dickson, under the general Pennsylvania laws for the incorporation of metal companies.

The Lincoln Foundry Company, of Pittsburgh, have made application for a charter of incorporation. The incorporators are Wm. L. Abbott, Otis H. Childs, James H. Lockhart, F. A. Campbell and G. G. Smith. This concern will take over the interests of the Lincoln Foundry Company, a limited partnership at Pittsburg.

William M. Abbott, O. H. Childs, James H. Lockhart, F. A. Campbell and G. G. Small are to be the incorporators of the Lincoln Foundry Company, Pittsburg, Pa., organized some days ago for the purpose of conducting a general foundry and steel manufacturing business. Application will be made to Governor W. A. Stone, April 25, for a charter.

The Shickle, Harrison & Howard Iron Company, St. Louis, have contracted to remove their cast iron pipe foundry and steel casting plant to a location on the Belt Line Railway, East St. Louis, Ill. The company secure two blocks of land, and agree to have a building costing not less than $100,000 erected within a year and to have not less than 350 men employed.

Among the Foundries.

Timms Bros. are erecting a new foundry 24x50 feet at Farmer, N. Y.

Adams Bros.' foundry, at Findlay, Ohio, was burglarized of 300 pounds of brass April 10.

The new foundry of T. G. Mandt Vehicle Company, Stoughton, Wis., will be started up at once.

The Reading Foundry Co. has started up its North Reading plant, and will employ 500 hands therein.

Joseph Menier has been appointed foreman of the foundry department of the Michigan company.

Eastern roads have agreed upon round trip rates of one and one-third fares for the convention at Pittsburg.

The Variety Machine Company's plant at Warsaw, N. Y., is to be enlarged. The capital is increased to $50,000.

The Niles Boiler Co., Niles, O., has nearly completed its foundry and fitting shop. A pattern shop is also to be built.

The business of the Peck, Stow & Wilcox Company will be removed from Plantsville to Southington, Ct., about July next.

The Union Steel Casting Company, of Pittsburg, has been granted a charter of incorporation, with a capital of $70,000.

The Ross-Meehan Company, of Chattanooga, Tenn., is installing new engines and making other extensive improvements.

The Eagle Foundry, Lowell, Mass., which was gutted by fire a few weeks ago, is to be rebuilt at once by J. W. Bennett & Co.

The Port Huron Engine & Thrasher Works, Port Huron, Mich., have increased their capital stock from $200,000 to $328,000.

S. B. Sexton & Son, 511 West Conway street, Baltimore, will erect a four-story brick building to their stove and iron foundry.

Frank Moore, P. H. French, John M. Patterson and Geo. A. Dickson have applied for charter for The Pittsburg Brake Shoe Company.

Work has begun on the Mammoth repair and car building shops of the Rock Island road, at Valley Junction, Ill. It will be 400x210 feet.

Plans for the contemplated improvement at the Hainesport, Mt. Holly, N. J., iron foundry are being prepared by Philadelphia architects.

The Blair County Court has appointed J. Gemmell Davis receiver of the Altoona Foundry at Altoona, Pa. Recorded liabilities, $20,000.

Two thousand iron ore miners in Bibb county, Ala., have gone on strike. The cause is said to be a complaint against the check system.

The Pittsburg Steel Foundry Company, of Pittsburg, has secured a charter with $250,000 capital stock. The plant will be at Glassport, Pa.

The Centerville Foundry and Machine Company, of Centerville, Iowa, has failed, and the mortgagee, Joseph Goss, has acquired possession.

The new government foundry to be built at the Portsmouth navy yard, with outfit of brass furnaces, cupola, crane and ovens, will cost $10,000.

D. D. Thorpe, acting for W. V. Moore, principal creditor of the Frontier Iron Works, Detroit, bid in the property at receiver's sale for $30,000.

In the case of Patrick Coleman vs. The Mechanics' Iron Foundry Company, mentioned elsewhere in this issue, the jury awarded the plaintiff $3,300.

The R. M. Tanner foundry at Herkimer, N. Y., was closed out at receiver's sale April 14th. The machinery was sold for $1,891, and the plant for $4,260.

Louis Ladam has sold his foundry at North Adams, Mass., to W. F. Corkum, who will continue the manufacture of school furniture, and general jobbing.

The Southern Car and Foundry Company, a new consolidation with $2,000,000 capital, is composed of the plant at Gadsden, Ala., Memphis, and Lenoir City, Tenn.

The Ball Foundry Company has leased the foundry in Lynn, Mass., formerly occupied by the Lynn Brass and Iron Company, and will immediately start it up.

The Gillette-Herzog Co., of Milwaukee, has leased the malleable iron plant of the Wood Harvester Co. in St. Paul. The company plans a large extension of business.

The car wheel foundry at Lenoir City, Tenn., is running full, making over a hundred wheels a day, besides other work; the intention is shortly to turn out 150 wheels a day.

The Shenango Machine Company, of Sharon, Pa., will erect a new brick foundry 150x100 feet. There will be two electric traveling cranes, and two new melting furnaces.

The Warren Foundry and Machine Company of Phillipsburg, Pa., recently sent a check for $250 to the Easton hospital, thereby renewing the company's support of a bed for the ensuing year.

The Muncie Foundry & Machine Co., Muncie, Ind., capital $25,000, has been incorporated. Directors: A. F. Patterson, G. F. McCulloch, W. M. Patterson, W. C. Denney and W. C. Sampson.

Kreps Bros., at Greenville, Pa., have leased their foundry and machine shop to the Palm Gas Company, of Butler. This company will manufacture gas engines, and will employ a large number of men.

The Pittsburg Steel Casting Company has decided to change its name to the Union Steel Casting Company. They have a paid-up capital of $70,000, and will erect their plant as rapidly as possible.

The Sprocket Chain Mnfg. Co., of Detroit, has filed articles of association for the manufacture of sprocket chains. Capital, $75,000. T. D. Buhl, L. B. Ball and Alex. McPherson, principal stockholders.

Rogers Bros. have taken the foundry formerly occupied by the Biddall Mnfg. Co., Chelsea, Mass., and will continue the manufacture of brass, composition and aluminum, making fine castings a specialty.

The Pittsburg Machine Tool Co., Pittsburg, Pa., has been incorporated with $250,000 capital stock. A plant will be erected in Allegheny City. Frank Moore, president of the Pittsburg Malleable Iron Co., is president.

Contracts have been let for extensive improvements at the Waukesha Malleable Iron Works, Milwaukee. Two new ovens will be constructed, and also a fire proof pattern vault. The improvements will cost about $10,000.

The Aschman Steel Casting Company, Sharon, Pa., manufacturers of open hearth steel castings, have erected a new melting furnace, and installed two 15-ton electric traveling cranes, which, with other late improvements, cost $30,000.

Philadelphia and Roanoke capitalists have purchased the Radford Pipe and Foundry plant at Norfolk, Va., built at a cost of $500,000. The plant will probably be operated by the new concern and will give employment to about 800 men.

The big new wheel foundry to be built at St. Charles, Mo., by the car company will be 300 feet long, 80 feet wide with two additions, each 50 feet, slate roof and brick walls 25 feet high. The capacity of the foundry will be 350 to 400 wheels per day.

The Lakeside Malleable Iron Co., of Racine, Wis., is making extensive improvements to its plant, by adding a 15-ton reverberatory furnace, two 100 h. p. boilers and a Corliss engine. This will increase the capacity from eight tons a day to about 20 tons.

The Wolverine Brass Company has filed articles of association at Grand Rapids, Mich. Capital stock, $20,000. Louis A. and Harold C. Cornelius each holds one share; Sarah L. holds 1,120, and Edith M. Cornelius 439, and Clara B. Workman 230 shares.

Wm. B. Berry has brought a suit for $10,000 damages against the Kansas City Car & Foundry Company in the District Court of Kansas City, Kan. Berry was working at the Kansas City Car Works when he met with an injury resulting in the loss of his right hand.

When the additions to the Long & Allstatter Company's foundry at Hamilton shall be completed, it will be 206 feet long. It will have two 30-ton cranes traversing the whole length of the building. The new core rooms, ovens, sand sheds, etc., will be all under one roof.

A Haydenville, Mass., paper says: The principal topic of discussion in this village is the cut in the wages of the molders at the brass shops. The announcement was received like a blow to the workmen, and Tuesday the molders refused to go to work until a conference could be had with Mr. Hills.

The plant of the Portage Lake Foundry & Machinery Company, at Ripley, Mich., passed into the control of Mr. Wm. S. Cleaves, May 1. Mr. S. E. Cleaves, the pioneer foundryman and mechanic of the copper district, will be superintendent. The Messrs. Cleaves have been connected with the foundry for nearly 30 years.

James A. Wing was taken to the corporation hospital from the Lowell, Mass., Machine Shop Foundry, yesterday afternoon, and later taken to his home, 166 Shaw street, in the ambulance, after fainting away three times. Mr. Wing passed a comfortable night, and was feeling better this morning. His fainting away is attributed to weakness from overwork.

The old established works of the Haydenville Co., Haydenville, Mass., and New York

city, manufacturers of brass and iron valves, cocks, gauges, etc., etc., have been reorganized, and the following officers elected: President, C. J. Hills; vice-president, C. K. Sanborn; treasurer, A. S. Hills. The New York office has been changed from 73 Beekman st. to the American Building, 150 Nassau st.

The Sioux City Tribune says: The first order for the casting of new iron columns that has been placed in Sioux City since the crash of 1893, when both of the foundries here suffered financial collapse, has been placed this week with the Soo iron works. The columns are to be used in the improvements that are in progress on the Badgerow block.

It is stated that there is urgent need in the City of Mexico for more foundries and machine shops capable of doing first class work promptly. With the large number of improvements under way there and the number of establishments the city now has, with machinery often in charge of inexperienced men, the supply and repair business is large and prompt filling of orders is almost unknown.

According to a report in the Worcester Telegram, the city of Gardner, Mass., (pop. 9,000) has a fire department, and works the horses that are intended for use in connection with the fire engine on road making. The stove foundry took fire the other day when the team was one and a half miles from the engine house, and the firemen had to haul the machine to the scene of the fire by hand! Is this an example of New England thrift?

The Warwick Iron Works at Newport News, Virginia, have been leased to Messrs. G. T. Hardy, T. M. Moriarity, J. C. Mackly and F. B. Cooper. The foundry department has been leased to Messrs. S. J. Wright and R. M. Deetz, who have formed the Peninsula Stove Works. The foundry will be equipped with 7, 10 and 15-ton cranes, a 36-in. cupola, and other facilities, and, so soon as the supplies which have been ordered arrive, the business will be put in operation.

The John Featherstone's Sons, foundry machinery manufacturers, in business for a number of years at Halsted and Front streets, Chicago, made a voluntary assignment in the County Court April 24 and named Charles A. Tinkham as assignee. No reasons were specified for the action, and no estimate is made of the assets and the liabilities of the concern. A confessed judgment was entered last week before Judge Gibbons of the Circuit Court against the firm for $35,000 in favor of the National Bank of America.

C. W. Osgood has sold the Osgood & Barker Machine Shop and foundry at Phoenix, Vt., to a syndicate, which will enlarge the business and continue it under the name of the Bellows Falls Machine Company. The stockholders of the new company are: S. T. Coy, Geo. B. Wheeler, Jas. H. Williams, Wallace White, Howard Parker, Lavant M. Read and John H. Williams. Officers: President, S. T. Coy; vice-president, L. M. Read; treasurer, Geo. B. Wheeler; clerk, John H. Williams; general manager, Wallace White; superintendent, Howard Parker.

Announcement was made April 22 of the sale of the Osgood & Barker machine shop, foundry and real estate at Bellows Falls, Vt., to a syndicate of Bellows Falls business men composed of Wallace White, George B. Wheeler, Howard Parker, S. T. Coy, James H. Williams, John H. Williams and Judge L. M. Read. Immediate possession will be given, and the new owners will be incorporated under the name of the Osgood & Barker Machine Company. Wallace White, for many years connected with the old firm, will be business manager, and Howard Parker superintendent of the mechanical department. The concern has done a large business, particularly in the line of paper mill machinery and repairs. It is the expectation of the new firm to materially increase the product of the plant.

A Pittsburg firm has received an order for $1,500,000 worth of iron pipe for Johannesburg, South Africa.

No. 1 Alabama iron sells at $17.00 in Boston. The same iron can be sold in Europe for much less money, and afford a handsome profit to the makers.

No. 1 foundry iron is selling at $12.50 at Birmingham. This is $5.00 per ton more than it sold for last year. It costs not more than $7.00 per ton to make the iron to-day; $5.50 profit is pretty comfortable!

THE FOUNDRY is "THE PAPER."
ALEX. S. PALMER,
Ottumwa, Ia.

NOTICE!

Advertisements in this column, 30 cents a line for each insertion About seven words make a line. The Cash and Copy should be sent to reach us not later than the 20th to insure publication.
Answers addressed to our care will be forwarded.

TO SUBSCRIBERS

whose names appear on our **subscription** list, we will give one free insertion under this heading to those in want of positions, the advertisement to occupy a space of not more than five lines. Additional space or insertions must be paid for in advance at regular rates.

WANTED—A sand blast; new or second-hand, to be used for cleaning hollow-ware and other castings. Address, Box 230, care THE FOUNDRY.

WANTED—Position as foreman pattern maker; extensive experience; best of references; strictly temperate. Address, Box 255, care THE FOUNDRY.

FOR SALE—Cheap; two or three iron carriages for core ovens, suitable for the heaviest work. Address, Bridgeport Deoxidized Bronze & Metal Co., Bridgeport, Conn.

FOR SALE—A No. 5 Roots blower and engine combined; has been in consecutive use less than one year, and is in good order. Address, Box 260, care THE FOUNDRY.

WANTED—Position as foundry foreman; 37 years old; 8 years' experience as foreman. Mining machinery preferred. Best of references. Address, Box 261, care THE FOUNDRY.

WANTED—Position as foundry foreman, by sober, competent man, 7 years' experience as foreman in steam and gas engine, and general jobbing shop. Address, R., Box 262, care THE FOUNDRY.

WANTED—Foreman for foundry making castings in loam, dry and green sand. Must be able to manage men to advantage, and give the best of references. Address, Box 253, care THE FOUNDRY.

WANTED—A bright, active foundryman to take charge of a modern plant making medium weight machinery castings. Must be a good manager, capable of handling men and running iron. Address, Box 1011, Springfield, Ohio.

WANTED—A practical foundryman to become interested and take charge of a foundry making a first-class line of hot air furnaces and heaters; a good opening for the right party. Address HEATERS, Box 267, Care of FOUNDRY.

WANTED—Thoroughly competent foreman; one who has had experience in making both light and heavy machinery castings. Must be a young man and a hustler. Give age and references. Must not use intoxicants. Address, Box 256, care THE FOUNDRY.

WANTED—Position as foundry foreman. Have had 20 years' experience on light and machine castings. Cupola practice has been a study with me, and have always had good results. Steady position desired. References exchanged. Address, Box 259, care THE FOUNDRY.

WANTED—Agencies. Well-known, first-class commission agents, established in Brussels, desire agency for articles likely to have market on the continent. Engineering, electrical, or hardware trade preferred. Best references. Apply to V. H. B., 1899, Iron Age Office.

WANTED—To correspond with a young man who would like a position as assistant foreman in a gray iron foundry making light castings. A fine opportunity for the right man. Give age, experience, references and salary wanted. Address, Box 254, care THE FOUNDRY.

FOR SALE—On account of old age; foundry and machine shop for one-third its value; $3,000 cash and $2,000 on long time. Foundry business was never better. Don't write unless you have the money. Investigate our city. Address, L. D. WILSON, 110 W. 7th street, Des Moines, Iowa.

WANTED—Foremanship of malleable iron foundry; competent in malleable, gray iron or brass, and in annealing; practical molder, and experienced foreman; have position as foreman now, but wish to make a change account climate; A1 references. Address Box 266, care THE FOUNDRY.

WANTED—By an up-to-date foundryman, a position as superintendent, or foreman; 20 years' experience in managing men, making all kinds loam, dry and green sand castings. Thoroughly understands molding machines, core-making and melting of iron. Best of references. Address, Box 258, care THE FOUNDRY.

WANTED—Position as foreman of a brass foundry. A first-class brass molder, and am perfectly familiar with all the details necessary to do good work and to make the business pay. Would like to correspond with parties who may be in need of a good foreman. Can furnish the best of references. Address, Box 265, care THE FOUNDRY.

I beg to express my very great satisfaction with your journal, and to say that it is almost impossible for me to retain possession of it in my place for very long, as everybody seems to want to get hold of "THE FOUNDRY" as soon as ever it reaches me.

W. E. PLUMMER,
Bradford, Eng.